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THE AUTOMOBILE

Motion Minutes in Truck Operation

How to Balance Time and Miles to Help Service

In running automobile trucks one of the vital points to be considered is how much to run them in order to get the best results. At ten miles a day the running time will be found to be too short in all but the most exceptional schedules; running nine hours a day and doing business for one hour also is out of due proportion. Somewhere in between there is a happy medium of activity where the mileage, time and revenue from operation are all in harmony. The discovery of this happy medium will be facilitated by the use of what has been termed the "motion minute" theory, an outline of which is given below in conjunction with a series of illustrations showing the wagon mile cost of track operation.

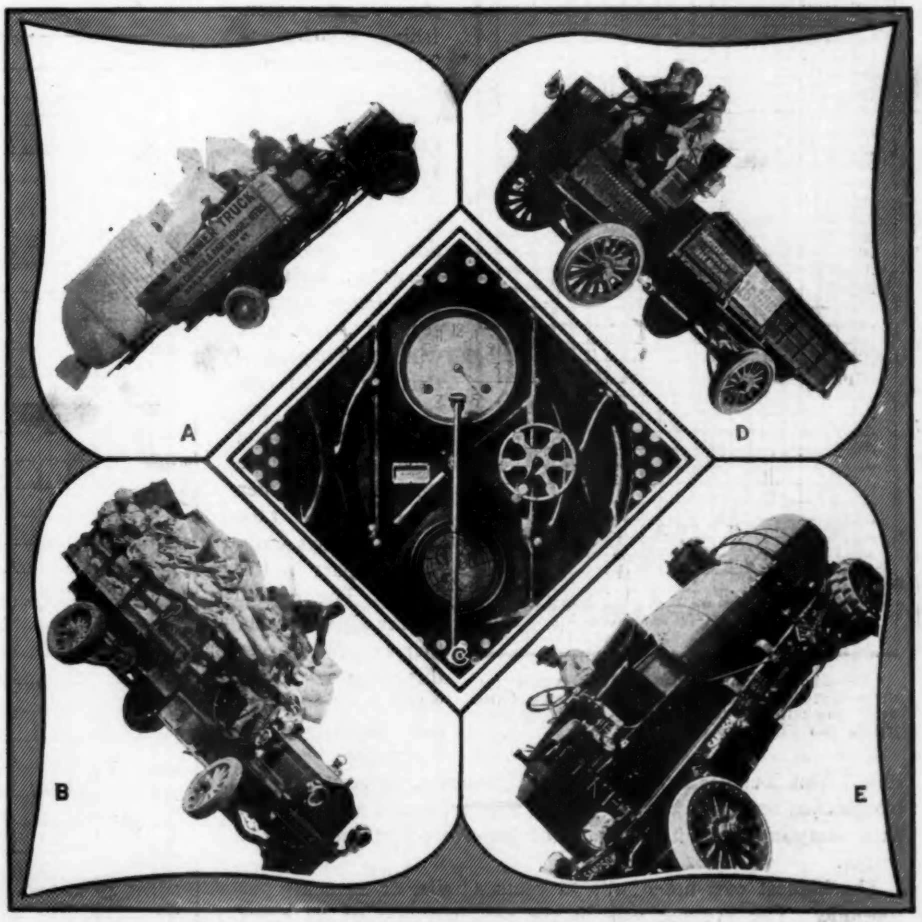
JUST what it costs to operate freight automobiles is one of the biggest and most important questions ever propounded to the commercial interests of the world. If it can be shown conclusively that such costs per wagon and ton-mile are sufficiently low to command the use of the automobile for the transfer and delivery of freight, the installation of motor trucks and the displacement of the horse must take place generally and with complete thoroughness.

Even at a moderate rate of speed the automobile truck is vastly more efficient than a corresponding amount of horsepower and consequently the only question to be considered is that of cost.

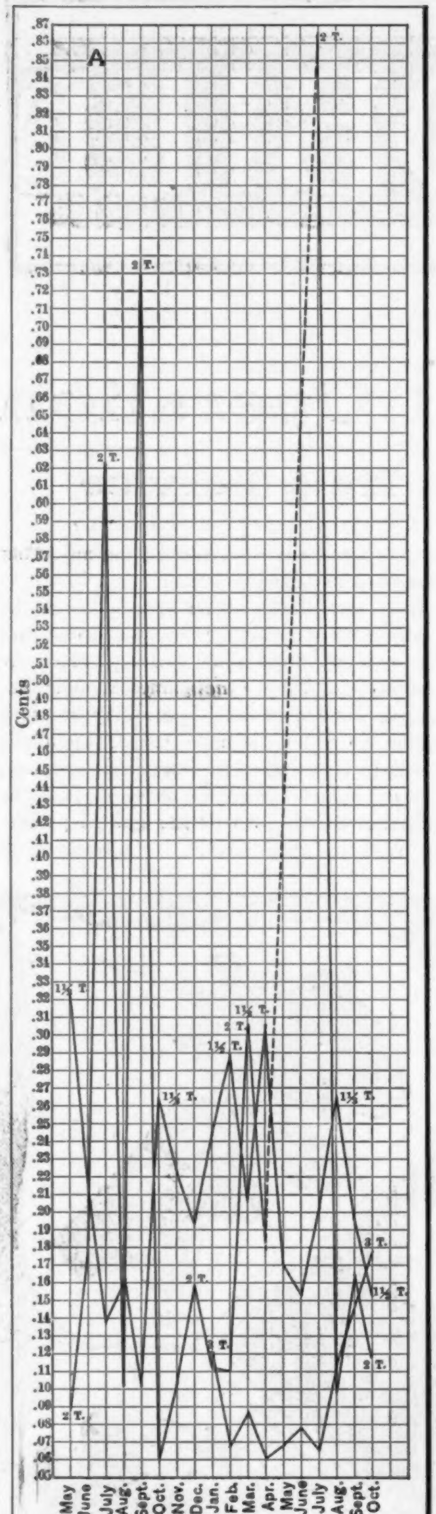
In the accompanying article, illustrated by a series of plotted curves, the actual experience of 400 trucks during a period of eighteen months' real business service is set forth. The trucks represent three sizes of standard gasoline cars, respectively of 1 1-2-ton, 2-ton and 3-ton capacity; 1- and 2-ton electric cars of half a dozen different makes equipped with nickel-iron batteries and similar wagons driven by lead batteries.

The curves show the variation in cost between the various sizes of trucks and kinds of power used and the figures are not based upon any other hypothesis than that contained in actual practice.

The business man whose interest has been aroused over the ramifications of the problem of whether or not to install trucks in place of horse equipment probably has had elaborate sets of figures presented to him by the companies who manufacture automobiles suitable for his needs. These may be more or less correct, depending to a considerable extent upon the amount of actual knowledge the prospective buyer may possess, dealing directly with the subject. Against these figures he probably has some experience of his own or has gained possession of data covering some of the phases of operation in



(A)—Representing a long haul and a single item to be delivered. (B)—When the units of the load are small and much of the time is taken in the stops and in the delivering of packages. (C)—Suggesting the use of a suitably contrived clock to keep track of the time taken in loading, separated from the time taken in traversing distance. (D)—When the freight automobile is making its way back without load—it should be capable of running at an economically high speed. (E)—Suggesting the character of freight that is easy to load and the idea that the freight automobile should then have a large capacity, also a well-designed speed of travel.



(A)—Showing total cost per wagon-mile for three types of gasoline trucks. 1½T means one and one-half-ton trucks; 2T means two-ton trucks and 3T means three-ton trucks

the hands of other business men.

In this article THE AUTOMOBILE presents the largest, best, and, in fact, the only authoritative statement of the operative truck costs and maintenance charges ever published. The experience here chronicled was not gained in a single city or derived from observation of a single make of automobile. There are over 400 cars involved and each item represented in the illustrations stands for a concise fact.

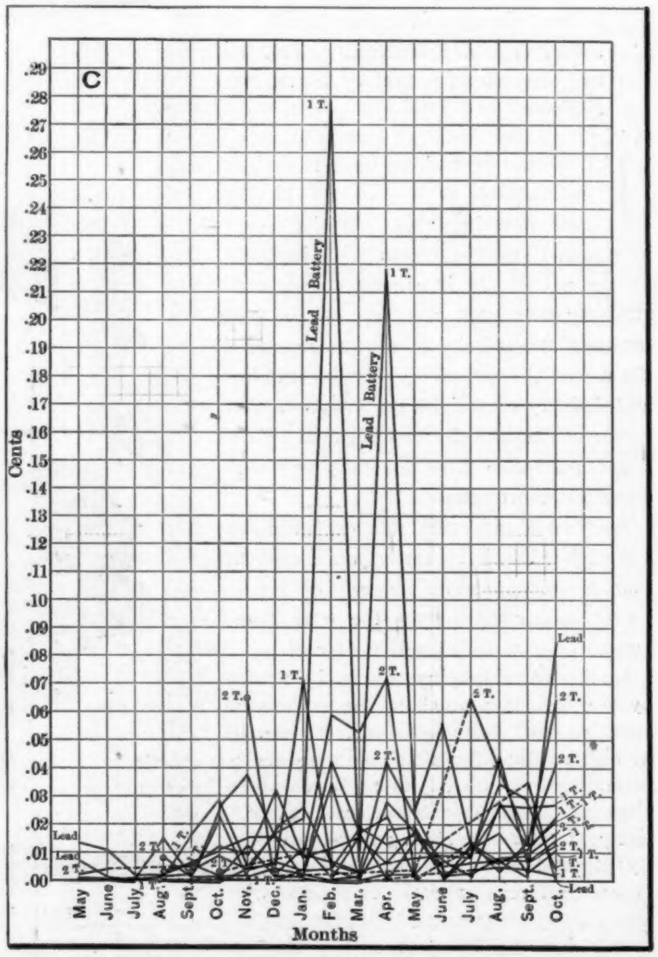
In analyzing the facts presented in Fig. A, which covers the cost of operating and maintaining gasoline-driven automobile trucks, the figures show some astonishing conclusions. The smallest wagons of the gasoline type considered in the curves are cars of 1 1-2 tons capacity. The curve shows the cost of operation for seventeen months, including two busy summer seasons and one winter. They show that the winter cost is about on a par with the running and maintenance charges in summer and that the weather plays only a small part in the totals. The lowest figures shown in the curve illustrating this type of truck were about 10 cents per wagon-mile, or 6 2-3 cents per ton-mile. This includes tires, gasoline, oil, interest, depreciation, replacements, repairs, wages of garage employees and supplies. In fact, everything except the wages of the crews that operated the trucks.

The highest cost noted was 32 cents a mile, or 24 cents per ton-mile. The average was in the neighborhood of 24 cents per wagon-mile, or 16 cents per ton-mile. The cars were comparatively new at the beginning of the period under observation, and it may be noted that at the end of the seventeen months illustrated in the diagram the cost of operation and maintenance was slightly under the average figures given above.

The next larger size of gasoline truck, the cost of which is outlined in Fig. A, were 2-ton automobiles and cars that represented a time when the truck was in a formative period. They were old during the time referred to and from the first had been expensive as compared with more modern examples of mechanical skill. The monthly range of operative and maintenance cost was excessively wide and ran from 6 cents a mile to 86 cents. During the seventeen months there were three distinct periods in which costs mounted high for this type, reaching, besides the 86-cent mark, 62 cents and 73 cents, respectively. A fair average cost, considering this sort of automobile, as shown in Fig. A, would be about 46 cents per wagon-mile, or 23 cents per ton-mile, for freight. The figures show that the summer cost was greater than winter cost. The tremendous apices of the cost curves were due to mechanical troubles, which required expensive replacements and delays. This also affected the total mileage accomplished.

The biggest gasoline trucks observed were of 3-ton carrying size. These cars were almost new when placed in the service described and during the year here outlined they encountered no undue mechanical troubles. It may also be said that since the time referred to they have stood up satisfactorily. The very moderate total of 6 cents per wagon-mile, which means 2 cents per ton-mile, was the best showing made by this size of truck. The highest wagon-mile cost was reached at the end of the year of service and was 18 cents, or 6 cents per ton-mile. The average was 12 cents per wagon-mile, or 4 cents per ton-mile for the whole year.

Taking the average ton-mile rate of the three sizes of trucks, one has 16 cents for the 1 1-2-ton trucks, 23 cents for the old 2-ton wagons and 4 cents for the 3-ton size. This would give an average of 14 1-3 cents per ton-mile.



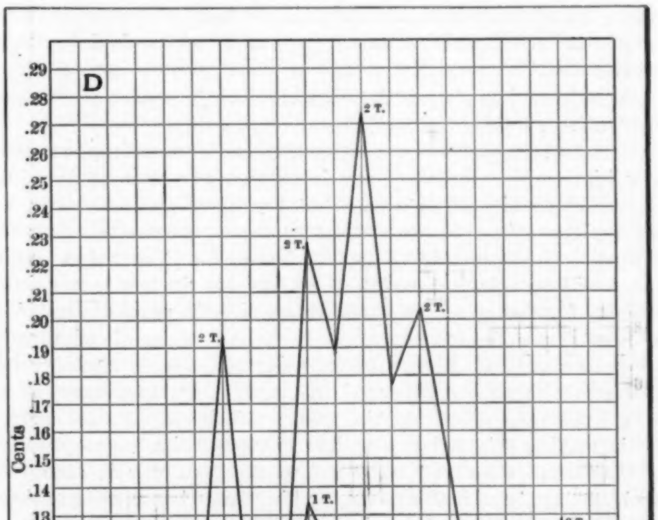
(C)—Battery costs per mile for one- and two-ton trucks, equipped with Edison and lead cells

As far as total figures go the charts and plots covering the cost of operating and maintaining electric wagons in freight service are equally interesting and somewhat more detailed. The great question to be settled is as to the size of the car to be used, with a view to economy and the type of battery. There are two sizes considered in this article and two types of batteries. The cars referred to are respectively of 1- and 2-ton carrying capacity, and the batteries are the standard nickel-iron and lead varieties.

The 1-ton cars were equipped with both kinds of cells and the larger cars generally had the nickel-iron batteries. Taking up the 1-ton size equipped with nickel-iron batteries, the curves shown in Fig. B tell a graphic story to the man who wishes to know something of the cost of operating freight automobiles of this type. Covering almost a year and a half the figures show that the total cost of running the cars and keeping them in condition to run ranged from 4 7-8 cents per wagon-mile, which means the same amount per ton-mile, to 65 1-4 cents per wagon-mile. The average, based upon eight different types of trucks so equipped, proved to be 16 cents a mile. This includes current, batteries, cost of wagon in the way of interest and depreciation, pay of garage employees and supplies, just as it did with respect to the gasoline cars considered above.

With the nickel-iron equipped trucks of 2-ton capacity the experience shows that the cost ranged between 10 cents per wagon-mile and 87 cents, and the average cost totaled 26 cents a wagon-mile, or 13 cents per ton-mile. The lead battery trucks averaged about 18 cents per wagon-mile in total operative and maintenance cost.

The conclusions to be drawn are that the 1-ton truck, averaging 16 cents per ton-mile, the 2-ton truck averaging 13 cents per ton-mile and the lead-battery trucks averaging 18 cents per ton-mile give a general operative average of 15 2-3 cents per ton-mile.



(D)—Showing the cost of current per wagon-mile under varying conditions of service

Comparing this showing with that of the gasoline cars gives a margin of 1 1-3 cents per ton-mile in favor of the gasoline automobiles, even including the unfavorable showing of the 2-ton trucks operated by that kind of fuel. If the basis of comparison is limited to the economical trucks, which computation has a better basis than appears in the bare curves of Fig. A, the difference in cost would be still more apparent, footing up 5 2-3 cents difference in favor of the gasoline cars.

In a matter of 3,000 miles a year this would amount to the distinctly appreciable sum of $170. Of course, the gasoline cars cost initially a trifle less than the electrics and the interest charge upon that basis would be slightly less for the gasoline cars than upon those which cost more money to install.

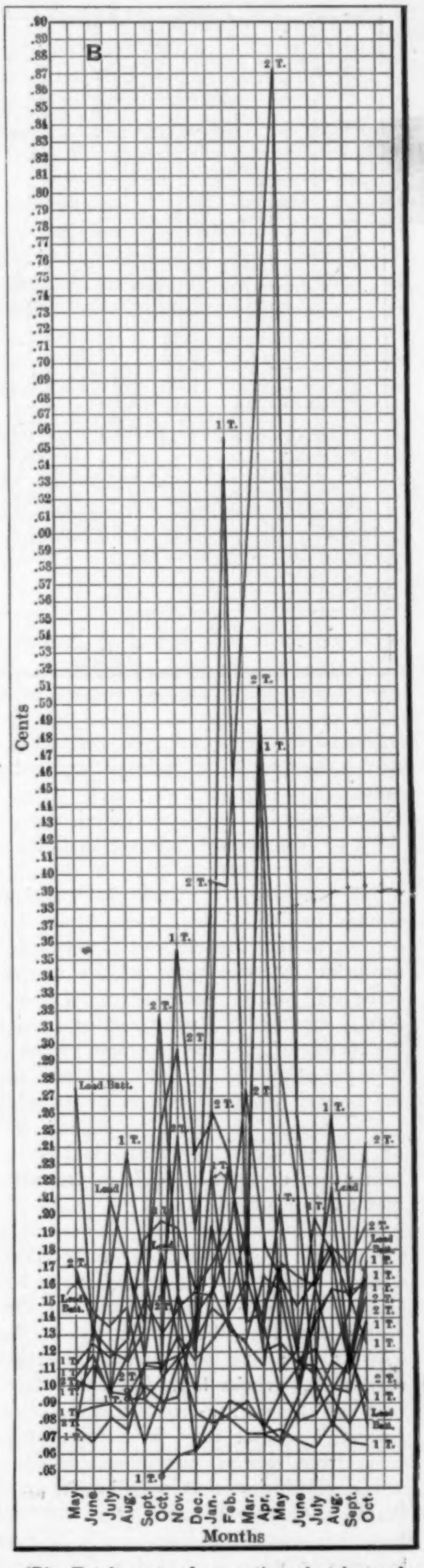
Briefly, the ton-mile cost of operating and maintaining 1 1-2-ton gasoline trucks for 3,000 miles is $480, as shown in the accompanying illustrations.

For the type of 2-ton trucks considered the cost per ton-mile would be $690.

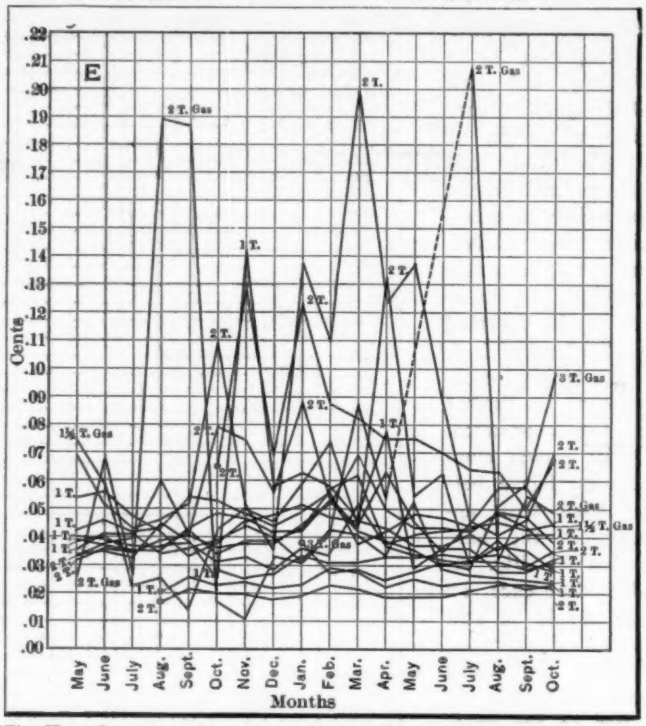
For the 3-ton type used in the illustration the cost would be only $120.

The average cost of operating gasoline trucks would be $430 for 3,000 miles, and if the excessive factor be eliminated the cost would be $300 per ton-mile for 3,000 miles.

The 1-ton electric truck costs on the same basis would be $480. The 2-ton cars would cost $390 and the lead-battery equipped trucks would cost $540. The general average cost of operation of all kinds of electric trucks proves to be $470 for each 3,000 miles traveled.



(B)—Total cost of operating electric trucks per wagon mile for nearly two years. 1T means one-ton trucks; 2T means two-ton trucks and Lead Bat. means that the trucks used lead batteries



(E)—How the wages of garage employees affect the cost of truck operation.

The figure 3,000 miles is used because in a rough sort of way it represents the mileage required annually of good motor trucks.

The cost of batteries per mile is the subject of Fig. C. Taking the 1-ton electric truck as the basis the plotted curves show that the nickel-iron battery costs on the general average $516.40 for a full year's service, while the lead battery costs $483.60 for a similar period. The former type of power weighs less and proved to be more cleanly. It avoided much of the danger of corrosion to other parts of the mechanism on account of its structure, but in general results the two types figured very closely together in the amount of service given and its cost. In the matter of cost the lead battery has a slight advantage which is counterbalanced in the increased operative costs outside of the battery itself by reason of its additional weight.

The figures above are calculated at a flat rate for current of 4 cents per kilowatt and include a depreciation charge of 33 1-3 per cent. The basis is 110 ampere-hours. No item of interest is charged.

Fig. D shows the cost of current per wagon-mile for all the electric trucks included in the illustration. It will be seen that the actual cost of charging the lead batteries was considerably less than the same item for the nickel-iron cells. One remarkable fact that is shown in Fig. D is that the current cost of operating 2-ton trucks averages close to the cost of current for trucks half that size. Of course it will be noted that one type of 2-ton trucks made a poor showing in this respect, but that may have resulted from some other cause aside from regular, economical service.

The conclusion that may be drawn from this chart is that the 2-ton electric wagon is more economical in current expenditure than the 1-ton wagon. It is equally apparent that lead batteries require less money for current to operate than do those of the other type.

Fig. E shows the cost of garage employees per wagon-mile for all types of trucks used in this illustration. As shown by the curves, this item of expense is larger for gasoline cars than for electrics and closely follows the size of the trucks. The average cost per wagon-mile proved to be not far from 4 cents.

Supplies, by which is meant everything supplied to the car to keep it in running condition, except garage labor, wages of its crew and fuel or current, are outlined in Fig. F. While a certain type of foreign 2-ton gasoline truck was much out of line in this particular, as will be seen by the sharp increase noted several times in the chart, the average expense figured 3 cents per wagon-mile.

One of the vital problems involved in the subject of truck operation is the proportion of time that shall be used in motion and the proportion used in rest for the mechanism and activity for the men who load and unload the trucks. In a word, this whole idea must be worked out to suit individual requirements. Experiments intelligently made and noted are the best guide, but in preparing for such experiments it may be well to consider the experience of others.

If, for the purposes of illustration, it is assumed that the annual mileage of the truck is 3,000 miles in 300 days of service, the daily mileage would be ten. Also assuming that the working day for the truck is ten hours the vehicle would have to go only one mile per hour. It is conceivable that such a rate of progress might be made profitably in certain kinds of service, but such service would have to contemplate very frequent stops and an immense amount of labor and time consumed in loading and unloading.

At the most moderate speeds the actual motion of the truck need not require more than one hour out of the ten, and consequently it would mean that the crew would have to work nine hours out of the ten. If this particular service was the delivery of heavy parcels in every block of the route it might work out satisfactorily, but the commercial field for such service is necessarily limited.

If 6,000 miles a year is taken for a basis the daily run would amount to twenty miles per day. This would give an average rate of two miles an hour, or possibly 120 minutes of motion, as against 480 minutes of rest for the wagon and work for the men. If in this service the stops average one-quarter of a mile apart there would be eighty of them during a day. If it requires six minutes for loading and unloading and a minute and a half for running the distance the total time necessary to handle a bit of freight would foot up to seven and one-half minutes.

Experience has shown that for certain types of business the rate referred to is economical and reasonable.

The most profitable route and rate must of necessity vary with conditions. For instance, any intelligent person with the full facts before him could figure out the most profitable way to do business via the motor truck under a certain set of conditions. If the problem involves a long haul and few stops there will be a large amount of motion for the truck and little activity for the crew. It would be manifestly uneconomical for a New York department store to deliver a spool of thread to a customer at Bronx Park, using a 3-ton truck for the delivery. Yet the delivery of that spool of thread may be a very important matter to the owner of the department store. If, in making this delivery, a light truck working on a schedule of numerous stops and low total mileage per day is used the problem can be simplified. If, on the other hand, the problem is to deliver a load of furniture to a Newark customer, furniture being light and bulky, the merchant naturally would not select the small light truck working on low schedule, but would send the goods in a big car with few, if any, intervening stops.

The conclusions to be drawn from the motion-minute plan referred to are that a medium should be reached where the minutes in motion, work of loading and unloading and the revenue shall be absolute maximum. As has been pointed out, each truck schedule is exceedingly worthy of careful thought and intelligent practice by those in charge of it.

Too few minutes of motion, or too many for the truck and too few minutes for loading and unloading or too many, will speak emphatically in the service rendered or revenue returned. There is a happy medium for all kinds of service, and to find it is one of the nicest problems that must confront the efficiency engineer.

The utility of high speed in the operation of automobile trucks will eventually occupy a more important place than it does at present. Automobile trucks, taking a general average figure, are most economical when operated at a rate that does not exceed eleven miles an hour, which means a maximum of about eighteen miles an hour. The best type of truck that has been brought out so far can be operated at an average rate approximating twenty miles an hour. High speed enters into the calculations in exact proportion to the mileage required. Thus in a high-speed truck of the kind referred to a daily schedule of eighty miles might be negotiated, allowing four hours for motion and six hours for loading and unloading. Such a schedule would be impossible for the car having a speed of fifteen miles an hour if the loading and unloading required the full six hours allowed for the faster car. Still more striking would be the example if the car had an average speed of only eleven miles an hour, as in that case the motion would occupy over seven hours and the work of the crew less than three hours.

Taking a 2-ton electric truck as an example. Suppose the car has a speed of ten miles an hour and its schedule is forty miles a day. The time required in running would be four hours, leaving six hours for loading and unloading. Suppose that the capacity load is carried all day. As may be noted in Fig. B, the average cost per wagon-mile is 26 cents, exclusive of garage rentals and wages of its crew. This would give 13 cents as the cost per ton-mile, and as the distance traveled on this schedule was forty miles the ton-mile total would be eighty.

In figuring the cost of operation the minutes in motion alone can be considered. The total cost of the day's run on this basis would be $10.40 and the motion-minute cost would be 43 1-3 cents.

Taking the general average ton-mile cost of operating gasoline trucks the motion-minute cost on the same mileage basis would be 47 78-100 cents.

The general average electric truck can be operated at 15 2-3 cents per ton-mile, according to the figures here shown, and on the comparative basis as above the motion-minute charge would be a little more than 52 1-5 cents.

The efficiency engineer will soon realize the limits to which the cost of the minute in motion can be carried with profit and must make his plans accordingly.

In this connection an interesting phase of the matter is presented in the showing of the 3-ton gasoline cars, the ton-mile cost of operating which was only 4 cents. Supposing that these cars have a speed average of 15 miles an hour, the exact economical length of the daily schedule is a most interesting example.

At sixty miles a day such a car at full load would deliver 180 ton-miles. At 4 cents per ton-mile the entire cost would be $7.20, and the motion-minute cost 30 cents. Naturally, with a car that can be operated at such a low ton-mile cost, the engineer must figure to do as large a mileage as possible in order to take advantage of the condition.

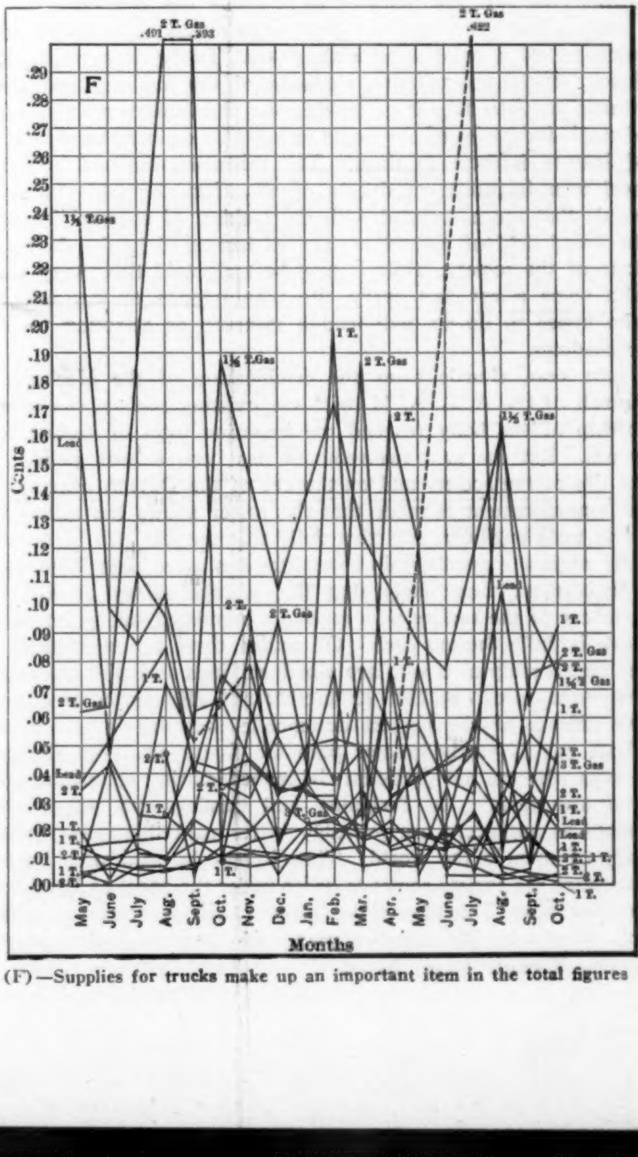
By paying close attention to the motion-minute cost of operation the engineer can tell to a day when a certain truck should be removed from a certain schedule or finally retire from service. It is obvious, if his records are full and true, that he can determine to a nicety the rate of speed and mileage that will produce the best results from the viewpoints of economy and revenue. Besides these things the arrangement of the schedules themselves can be made to eliminate anything that savors of "soldiering," or, on the other hand, careless arrangement of the running minutes and miles may place a premium upon lazy and inefficient labor.

If the seller of a second-hand car tries to persuade you that ignition trouble is due to a set of depleted dry batteries—and says that the ignition system will be all right as soon as the dry batteries are replaced by new ones—let him replace them and show you how well the automobile will behave.

German Auto Market

Some light is thrown on the conditions taken into account by the German buyers of American cars, and while this business so far has not been of the nature of a bonanza, there are remarkable possibilities in that country for the maker of good medium-priced cars.

GERMAN rates on motor cars are low; hence it is that in spite of local assertions to the contrary, those who are in the position to know, say that there is bound to be an invasion of cheap American-made cars into that country sooner or later. For a time, American manufacturers made no special attempt to conform to German trade regulations; but now it is admitted that while in Germany they consent to do as Germans do. So long as Americans insisted upon the German dealers paying cash and assuming all risks of sale, the outlook for a market for American-made cars was by far from bright. Germans all along have claimed that American automobiles were outside of the pale of popular models. But it is now admitted that the American manufacturer is trying to meet with the taste of German buyers. By co-operation, several American manufacturers might establish a common agency and send over a car for demonstration purposes, equipped ready for sale; and in addition, other automobiles ready for sale, together with a generous stock of pneumatic tires and extra repair parts. Accompanying these, there would necessarily need to be descriptive pamphlets printed in German. To meet the popular demand in Germany, a motor car should include the following features: Torpedo form; double phæton; gasoline motors; four cylinders (monoblock and vertical), having at least a 3-inch bore and a stroke of 4¾ inches or less; water-cooling equipment; 16 to 20-horsepower (effective weight, from 1,600 to 2,000 pounds); and a sales price (including windshield, top, lamps and horn) of $1,000.



(F)—Supplies for trucks make up an important item in the total figures

S.A.E. Looks for Big Dayton Crowd

Order Has Grown 400 Members in One Year

There are now enrolled in the Society of Automobile Engineers almost 1,000 members, and the forthcoming meeting next week is expected to attract a larger attendance than any heretofore held by the society. The program itself shows how great has been the progress of the society, and through the society, of the industry itself. It deals with the refinements of construction in a highly technical way, and the reports of the subdivisions of the Standards Committee are the big feature.

WHEN the Society of Automobile Engineers convenes at its Summer Meeting next Thursday morning at Dayton, Ohio, those present will represent a body that now numbers nearly 1,000 of the leading engineering minds of the United States, that are identified in any measure with the development of the automobile.

No better illustration of the importance of the automobile industry could be given than the size of the S. A. E. It has been said that the industry has had a rapid growth and that everything connected with it has had to increase with much speed in order to maintain anything like a proper alignment of forces. This is true and the tremendous growth of the society proves how fast the industry as a whole has swelled.

Only a few years ago the great engineering organization was composed of a handful of enthusiasts. To-day it numbers the flower of the constructive elements of the industry and constitutes an order that is of enough size and importance to scores of staple industries of the world to make its deliberations matters of intense interest to them. The railroads, financial powers, steel manufacturers, producers of manufactured and raw materials that are associated with the making of automobiles and the broad field of agriculture are all interested in the deliberations of the society, while it may be truly said that every man who owns a car and every one who intends to buy one or who hopes to do so, will lend a measure of attention to the proceedings.

Last year, shortly after the combination of the Mechanical Branch of the A. L. A. M. with the existing society, the membership of the body reached the imposing total of almost 600 names. But the past twelvemonth has been a busy period in the life of the society and on the eve of the Dayton convention the announcement is made that the roster shows the names of about 1,000 engineers and that fully that number will be on the rolls when the membership committee has acted next Thursday.

It is more than likely that the average salary of all the members of the society who receive a stipulated salary for their work is fully $10,000 each. Of course there are numbered in the membership men who are worth millions and who represent vast interests of one kind or another and also scores of executive officers of the biggest automobile factories in the world whose pay is vastly greater than the figure set. But the engineers who are not presidents of manufacturing companies and who are devoted to designing and turning out automobiles simply as engineers are probably better paid than any similar body of men in the world. Thus it may be said with justice that when the society comes to order under the gavel of President Souther next Thursday those present will represent a salary roll of at least $10,000,000 a year, and a return service representing a vastly larger figure.

Taking the membership one year ago as 600, the increase is approximately 400 during the past twelve months. This means the addition of eight names to the rolls for each week, Winter, Summer, Spring and Fall.

As will be noted in the program which appears herewith, the subjects to be considered at the coming meeting bear little resemblance to those with which the society busied itself in its earlier days. Where at first the pioneer engineers fought out basic things and made suggestions and recommendations that would be considered axiomatic nowadays, the society to-day takes up the intricate and technical refinements of details. For instance, the subject of general standardization will be handled by a committee consisting of eighty of the active members of the society. This standards committee is divided into a dozen or more subcommittees, each of which deals with a particular phase of the subject. The work of the subcommittees, and in fact the work of the whole committee, does not bind the society in any way, as its deliberations must be adopted by the whole membership in order to commit the organization to any special line of action.

The exceeding care with which action is protected is illustrated by the fact that a meeting of all the subdivisions of the General Standards Committee has been called for next Wednesday at the temporary headquarters of the society at the Algonquin Hotel, at Dayton. At this meeting it is planned to digest the recommendations of the various subcommittees and to prepare a specific report embodying the work since the last meeting for the consideration of the society.

The most minute details have been worked out by these subcommittees and some astonishingly small ramifications will be uncovered in the general presentation.

All of these things are of importance to the development of the automobile and some of them will undoubtedly be adopted as standard practice in the immediate future. The fundamental principle of the automobile was worked out many years ago, and the tremendous progress that has been made in structural and engineering methods during the past decade has been based almost entirely upon the small details of refinement. As the general principle has been settled, the activity of the society must of necessity be directed toward the little and seemingly unimportant things. Just how big and important these are in reality may be seen by a hasty and unschooled glance of comparison, first at an automobile of ten years back and then at one of the modern standard cars. The "cross between the ice-cream freezer and cuckoo clock" has gone forever and in its place is the artistic, useful, sturdy, swift automobile of to-day. And yet the foundation principle of the "freezer-cuckoo clock" type and the car of 1912 is practically the same.

Whatever changes have been wrought lie in the application of engineering skill and structural designing of the small details. Of course there is better steel used in current cars than was used in the first automobiles made. The frames are stronger; the parts are more perfect and, consequently, more enduring and one might as well compare a belle of Nashville, Tenn., with an English bull dog, as far as general pulchritude is concerned, as to compare the car of 1912 with that of 1900.

Starting with the betterment of steel used in the construction of American automobiles and running clear through to the uttermost refinements now being considered by the subdivisions of the General Standards Committee, these changes are in large measure accountable to the Society of Automobile Engineers.

The first day will be devoted to hearing reports of four subdivisions of the standards committee and two papers on motor mechanics, besides a short business meeting and the opening address of the president. After the session the members will inspect factories, witness aeroplane flights or suffer themselves to be entertained. In this latter respect there will be a baseball game and band concert both Thursday and Friday afternoons, and a special performance has been scheduled for the Casino Friday evening, at which a series of startling stunts will be presented. Saturday evening a banquet will be spread at the Automobile Country Club.

On Friday the subject of commercial vehicles will be taken up in detail, and for the only time during the meeting a series of general principles will be discussed. On Saturday the society will consider a long program covering a number of highly technical subjects, including another mass of reports of the standards committee.

All told a full dozen of these subdivisions will submit statements of their work and conclusions; nine topics for discussion have regular place upon the program and five other optional topcis may be presented. Eight regular papers will be read on a variety of subjects and an address is scheduled for Arthur Ludlow Clayden, editor of *The Automobile Engineer,* of London, Eng., at the Country Club banquet. The subject of ignition troubles will be treated by Charles F. Kettering, who will give a laboratory demonstration of troubles due to induction currents and other causes.

While the meeting will be held far from the metropolis and a considerable distance from the center of American automobile production, it is expected that it will attract a larger attendance than any that have preceded it. Southern Ohio is growing rapidly as a producer of automobiles and full delegations are looked for from Indianapolis and the Indiana field; Cincinnati, Cleveland and the Ohio field and Michigan, the West, and to a large extent, the eastern members of the society.

Program of S.A.E. Meeting

When the S. A. E. assembles June 15 in the Sun Room of the Algonquin Hotel, Dayton, Ohio, for a three-day session the program to be presented will cover a wide field of subjects. A large attendance is expected and the indications all point to a convention that will equal in importance any held heretofore by the society. Several of the papers will outline advanced thought upon various vital topics as appear below.

THE program of the Summer meeting of the Society of Automobile Engineers at Dayton, Ohio, June 15-17, will be as follows:

THURSDAY, 8:30 A. M.

Opening address by the president, Henry Souther.

Business Matters.

Reports of tellers of election of members.

Treasurer's report

Announcement of membership vote on constitutional amendments.

Professional Matters.

Reports of standards committee divisions.

a. Iron and steel division. Henry Souther.

b. Aluminum and copper alloys division. W. H. Barr.

c. Seamless steel tubes division. H. W. Alden.

d. Nomenclature Division. P. M. Heldt.

The Question of Long, vs. Short-Stroke Gasoline Motors. Paper by J. B. Entz.

Long Addendum Gears. Paper by E. W. Weaver.

THURSDAY AFTERNOON.

Aeroplane flights at Wright Brothers' grounds.

Baseball game at Fairview Park.

Band concert at National Military Home.

Inspection of factories.

Automobiles will transport members and guests from hotels to the various places desired.

THURSDAY, 8 P. M.

Professional Session—Commercial Vehicles.

The Influence of the Engineer on the Sales Department. Paper by William P. Kennedy.

Report of wheel dimensions and fastenings for tires division.

Topics for Discussion.

Special methods of loading commercial vehicles.

Dumping trucks.

Auxiliary apparatus for commercial vehicles.

Trailers for commercial vehicles.

Location of working and emergency brakes.

FRIDAY, 8:30 A. M.

Professional Session.

Elements of Ball and Roller Bearing Design. Paper by Arnold C. Koenig.

Worm Gears and Wheels. Paper by E. R. Whitney.

Reports of standards committee divisions.

e. Ball bearings division. David Ferguson.

f. Broaches division. Charles E. Davis.

g. Carbureter division. G. G. Behn.

h. Frames division. James H. Foster.

Topics for Discussion.

Transmission location—whether on rear axle or attached to car frame.

Underslung frames.

FRIDAY AFTERNOON.

Aeroplane flights at Wright Brothers' grounds.

Baseball game at Fairview Park.

Band concert at National Military Home.

Inspection of factories.

Automobiles will transport members and guests from hotels to the various places desired.

FRIDAY EVENING.

Members will visit a theatrical performance at the Casino in a body.

SATURDAY, 8:30 A. M.

Professional Session.

Rotary Valve Gasoline Motors. Paper by C. E. Mead.

Some Points on the Design of Aluminum Castings. Paper by H. W. Gillett.

Oversize Standards for Pistons and Rings. Paper by James N. Heald.

Reports of standards committee divisions.

i. Lock washer division. J. E. Wilson.

j. Sheet metals division. James H. Foster.

k. Springs division. A. C. Bergmann.

l. Miscellaneous division.

Topics of Discussion.

Multiple-disc clutches.

Six-cylinder vs. four-cylinder motors of equal rating.

SATURDAY, 1 P. M.

Banquet at the Automobile Country Club, Hills and Dales. (No charge will be made to those attending the banquet.)

Address by Arthur Ludlow Clayden, editor *The Automobile Engineer,* London, England.

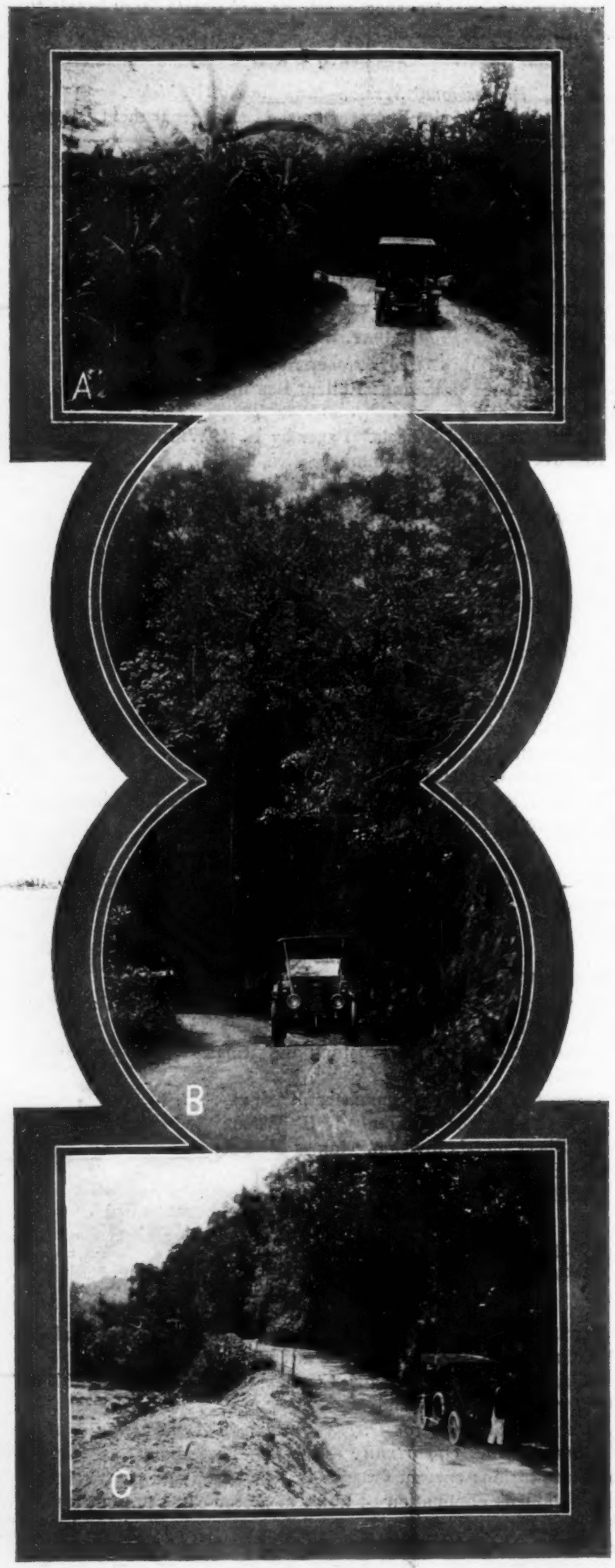
Additional Subjects for Discussion During Any Session of the Meeting, if the Opportunity Affords.—Three-point vs. four-point suspension; current practice in lubrication and practical results obtained; elimination of noise in motor cars; present trend in compression of gasoline automobile motors; contests and engineering lessons which they teach.

Ignition Demonstration.—During the meeting Mr. Charles F. Kettering will give in his laboratory a demonstration of ignition troubles due to induction currents and other causes.

All engineers interested in automobile and kindred work, whether members of the Society of Automobile Engineers or not, have been invited to be present.

Jamaica the Field for

The Caribbean Island



(A)—Touring cars are frequently seen along road to Castleton Gardens, which is very mountainous and picturesque

(B)—Road to Castleton, Jamaica

(C)—A thousand feet above sea level—along road to Port Antonio. The way water river below

If one wishes to enjoy the tropics under ideal weather conditions, the Island of Jamaica presents as many attractions to the automobile tourist as any place in the world. The island is 140 miles long by 40 miles wide and the British government maintains quite an extensive system of highways, in addition to which there are long stretches of passable roads in the various parishes. Gasoline is high in price, however, and special equipment of tires is advisable. The climate in the tourist season is wonderfully perfect.

FOR practical purposes there is no doubt that the automobile now ranks among the very highest of educational influences. There is nothing in the range of human possibilities that will tend to break down the walls of ignorance and narrowness and intolerance like actual physical and social contact. In the way of a contact maker between unrelated peoples the automobile occupies an unique field. In the depths of Tibet; far away from civilization on the Siberian steppes; penetrating the unknown ranges of China and a thousand out-of-the-way places all over the frontier of civilization, the motor car is bringing human beings in contact with one another. By serving this purpose it is broadening the general knowledge of the world.

The beauty spots of Europe are better known to-day than ever before; the wild grandeur of the Sierra Nevadas and Cascade mountains and the Sierra Madres and the Rockies and dozens of hitherto unknown scenic gems has been spread like a book before the eyes of those who care to see and enjoy.

Only a few years ago about the only thing the average American knew about Jamaica was that it was a big island in the West Indies belonging to Great Britain and its chief exports to the United States were bananas and a peculiarly "cocky" variety of British negro. These latter were inordinately proud of their British citizenship and considered themselves two or three good cuts above the common or garden variety of American negro, which assumption led to more or less friction, and it still continues to a greater or less extent.

Jamaica furnished New York with 50 per cent. of her hallboys, which proportion still maintains and the whole aggregation retains its allegiance to George V and will retain it toward his successors and assigns indefinitely.

When the average American was assured that he knew about the two staple exports from Jamaica and also had an inkling as to the potence of certain sugar and banana rums, he considered that he knew all that was to be known about the island.

But with the advent of the automobile, the Yankees have discovered that there is vastly more to Jamaica than they thought. Among the other things that have been found out about the island are these:

It lies about 130 miles south of the east end of Cuba, across the wide channel, which during the Spanish War was the scene of busy naval activity. The island lies practically east and west in the bosom of the dimpling Caribbean Sea in North Latitude 18 degrees, which is well within the bounds of the north Tropic Zone.

It is about 40 miles in its widest diameter and, like all the islands of the archipelago, is mountainous. In fact, Jamaica represents the portion of a submerged mountain chain that is not submerged in its immediate locality.

an Automobile Tour

Offers Many Attractions

It was discovered by Columbus in 1494 and presented such an aspect of agricultural promise that the Spaniards colonized it in 1510. During one of the periodic and almost continuous wars between England and Spain the island was invested by the British in 1655 and has remained a royal colony ever since.

The island is divided into three big counties. Cornwall on the west; Middlesex in the center, and Surrey on the east. These counties are in turn split up into parishes, something on the lines of the territorial and political subdivisions of Louisiana.

Spanish Town, located on the south shore upon an estuary known as Old Harbor, was the original capital of the island, but to-day even the name of the town has disappeared from the maps and the village that occupies its site is simply known as Spanish Town. Kingston, situated upon the land side of a land-locked bay, is the capital. It is a thoroughly British settlement into which has been injected the atmosphere of "manaña."

In the vicinity of the capital there are numerous well-kept roads that afford the groundwork for some delightful automobile rides and tours, and out in the island there are a few stretches of highway that tend to make the tourist use some superlative adjectives. But in the main the roads of Jamaica are bad. One rainy season tends to destroy any dirt road and consequently the only serviceable, all-the-year-around highways are those specially constructed of broken stone.

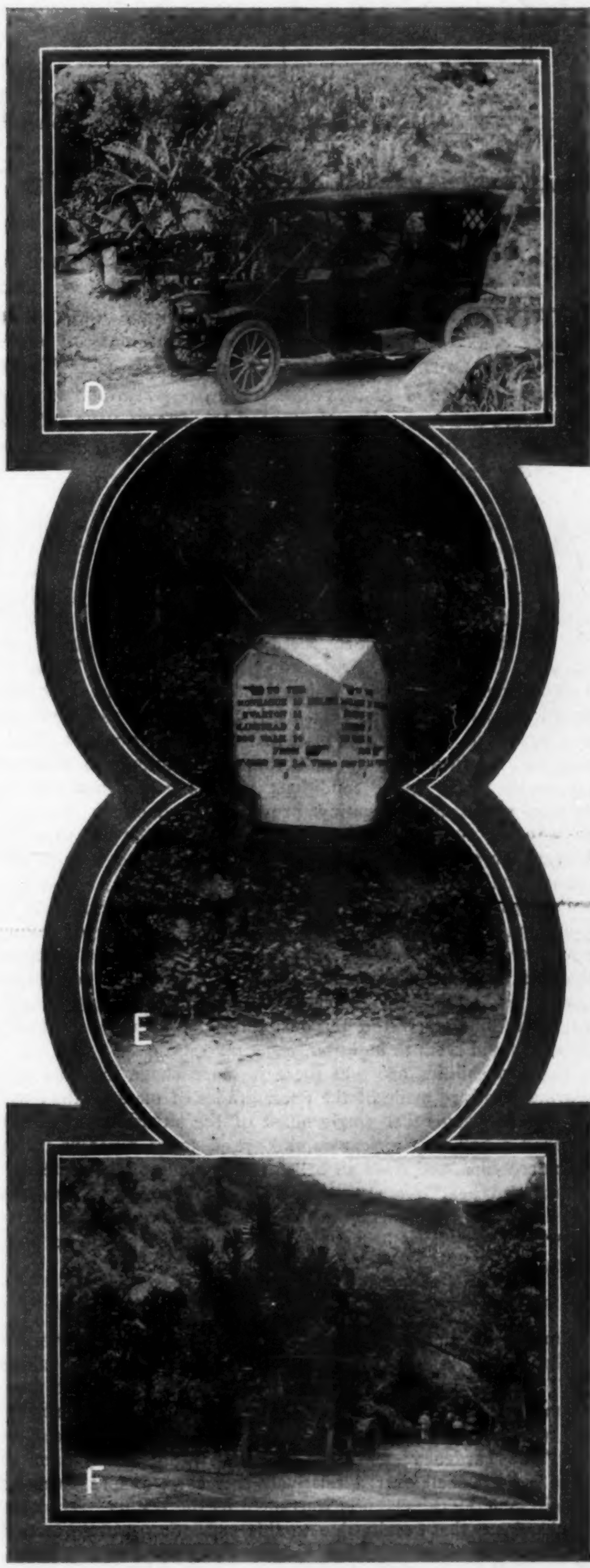
After a rain touring in the outlying parishes is impossible. The soil is peculiarly slippery, and as the grades are heavy the machine that negotiates them even in good weather must be a sterling performer. All told there are some 200 miles of macadam roads in Jamaica that are supervised by the government at great expense, and these may well rank among the best tropical highways known to man. There are hundreds of miles of passable highways in the various parishes and several hundred miles of jungle and mountain trails that are usable in good weather.

To the tourist who plans an expedition to the island the prospects are entrancing, but he should remember that fuel is high in price and that toll-charges are exorbitant in some sections. Special tire equipment is advisable and a light car, well-powered and fitted with cushion or solid tires, would seem to have its advantages. It has been estimated that the wear and tear of the ordinary pneumatics in the hill country amounts to three cents per mile per tire, and if the tourist goes over 2,000 miles of that character of road, his tire bill will be considerable.

However, moderate speed and careful driving in connection with a discriminating selection of roads will tend to limit expense of this character. Much better than the average of tropical accommodations are available for tourists, due to the universal characteristic of the Britons to avoid unnecessary hardship in their living arrangements.

In Jamaica the chief industry is agriculture and after nearly three centuries of occupation there is still a distinct Spanish tinge to the people. The negro and negroid races are very strong numerically, and several of the parishes are practically populated with the dark-skinned race.

One curious thing that will be noted in Jamaica by the observant tourist is that the soft drawling speech that has been associated with the negro by Americans on account of the accent of our Southern negroes is absent and in its place one finds a metallic sound in the speech of the Jamaicans that is startling.



(D)—Very picturesque huts built by natives seen along road to Port Antonio, reminds one of pictures seen in a school book of life in the African jungle

(E)—Roads in Jamaica are posted with plenty of good signs

(F)—Mountain scene near Castleton Gardens

In the Use of Ball Bearings

Advocating Large Sizes of Bearings of Good Material

Account is taken of the kinds of metal that are used in the fashioning of annular type ball bearings, and some of the remarks have influence upon the practice of selecting the sizes of bearings that will be overloaded in the regular course of events. It is hinted that the good results that have been realized in late years are to be directly traced to conservative ratings and to the further fact that the makers of automobiles have lived up to their high ideals.

ANNULAR types of ball bearings are widely used under the most exacting conditions of service, beginning with crankshafts of motors and throughout the structure, even down to the magneto. The literature of the subject is rich in uncertainties, but this absence of information is made up for by the popularity with which these bearings are greeted, and, barring the work of Professor Stribeck, of the Technical Laboratories near Berlin, it is doubtful if there is much authentic material that has been made public, such as would aid the interested reader in his attempt to find out why a single row of balls in a raceway in the annular relation will work so constantly under severe conditions, with only here and there a failure, which, upon scrutiny, proves to be due, for the most part, to the poor mounting of the bearing or the use of acid-bearing lubricant, mingled with the silt of the road, unless, perchance, the bearings are allowed to run dry.

Perhaps the most important matter at the present time is to bring automobilists to a realization of the necessity of taking good care of the bearings in their cars, if it may be assumed that the builders of automobiles have arrived at the conclusion that it is economical to employ large-sized bearings—much larger, in fine, than the responsibilities as they are normally viewed would seem to indicate.

The probabilities are that there is more virtue in using ball bearings that are made of the finest grades of material than will be found in any other single phase of the situation. However polished a ball may appear to the eye, it looks different under the microscope, and since all balls are not made of the same materials, and heat treated on precisely the same basis they are likely to differ from each other, both as to texture and in appearance when they are brought under the experienced eye in a laboratory.

How Grade Materials Are Selected

Among metallurgists there are quite a number of plans for producing the kind of hardness that seems to be efficacious for ball bearings. In one school it is the practice to resort to cementation; in other words, a mild form of steel is taken initially, and after the balls are smashed down to approximate size, they are "case hardened" and then finished. This is supposed to make a hard shell over a relatively soft core, and as hardness goes in general, the claim is warranted by the results. After all, the hardness that results due to this cementing process is that of carbon-steel with a carbon content of from 90 to 110 points, and the penetration of the carbon, while it might be as much as a thirty-second of an inch, it is not of necessity uniform all over the little sphere, especially when the latter is finished, due to the impossibility of taking metal off of the exterior at such a rate that the thickness of the hard shell will be the same at every point. Whether or not there is a serious problem concealed in this idea is a matter that will not have to be discussed at great length here, due to the fact that there are very few, if any, annular type ball bearings that are used in automobile work, of which it may be said that they belong to the case-hardened family.

Some time ago when the writer wished to ascertain very definitely the composition of balls used in annular types of ball bearings, he went to the pains of purchasing bearings on the open market and having them subjected to chemical analysis with varying results. As a general proposition it was found that there were two classes of materials current. One make of ball bearings showed a chemical composition as follows:

RESULT OF CHEMICAL ANALYSIS OF A BALL BEARING.

	Outside Race.	Inside Race.	Ball.
No. 15—Chromium	1.60	1.58	1.5
Carbon	0.893	0.80	0.90
Silicon	0.188	0.197	0.172
Sulphur	0.027	0.025	0.013
Phosphorus	0.019	0.022	0.010
Manganese	0.20	0.19	0.24
Copper	None	None	None
Arsenic	Trace	Trace	None

In this we have a very high grade of chrome steel, the properties of which are such that it takes on through hardness. This product also partakes of a relatively high polish. The physical properties of this material are accentuated as compared with carbon steel, and it is undoubtedly true that much of the good reputation that has been accumulated by annular types of ball bearings may be directly traced to this or equally good grades of alloy steel. But it has been shown by practical results that .90 carbon steel is also efficacious in ball bearing work, and it may be that the high polish is more or less to be attributed to the presence of a high carbon in a pure field; in other words, knowledge does not stretch far enough to tell whether or not chromium adds to the luster of the polish.

It will be observed that the chemical analyses of the two raceways and the balls do not check with each other. Of the considerable number of tests that were made at the instance of the writer, it was found that there was apparently an inclination on the part of makers of ball bearings to vary the chemical composition of these members with respect to each other, and it would not be impossible to find reasons for doing so. In the first place, the balls should be as hard as possible and capable of taking a very high polish, all of which is consistent with homogeneousness and freedom from brittleness. The inner raceway should be relatively hard also, because it has to do more work than is brought to bear upon the outer raceway in some respects. The outer raceway, if it has to be expanded during assembling, which is practiced by some makers, should hold properties that do not afford attractions either in the inner raceway or the balls. In other words, the outer raceway would have to be somewhat elastic, and anything but fragile, otherwise in assembling, when pressure is brought to bear and the raceway is expanded, it might fail to sustain under the stresses set up and the process would result in a commercial failure.

But the higher the grade of steel the greater is the amount of skill required in its handling and treatment if uniform results are to be relied upon. To bring out this point more forcibly it is only necessary to say that it is almost impossible for a bungling workman to so abuse a piece of Norway iron that it will deteriorate very much, whereas a piece of high-carbon steel in the hands of a man of this stamp would be destroyed, so far as its ultimate commercial value is concerned, before the completion of the first heat.

It would be far better to select plain bearings of proper sizes for a given undertaking than to adopt annular types of ball bearings, or, for that matter, any form of anti-friction bearings, simply for the sake of being able to say that these types of bearings are being used. If it cannot be said of an automobile that its bearings are liberally proportioned it should be stated of such a car that it is worthless to the purchaser from any point of view.

Half the Battle Lies in the Proper Selection of Bearings in View of the Work to Be Done

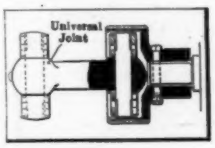
It was only two or three years ago when automobile designers bragged about the number of ball bearings they used throughout their creations, but they were not so profuse in their explanations as to whether or not the bearings were big enough to do the work, and it not infrequently happened that some of the bearings were foolishly large and others so small they failed utterly to perform on a basis that would attract the notice of a buyer who might reasonably expect a return on his investment.

If there is anything to be said in an attempt to describe what constitutes harmony in the design of an automobile it cannot be stated without taking perhaps 50 per cent. of all the explanation in telling why the bearings are on a basis of economy. There are very few persons who would fear that an axle might fall apart at some point between its extremities and even were such a thing to transpire, it would be known that a defect would be at the bottom of it, and it requires no stretch of the imagination to lead to the conclusion that defects in the solid section of the metal are not habitual, but if the bearings are too small, or if they are improperly mounted, failure will result; but, unfortunately, the date of failure will be deferred until the purchaser will have parted with his funds and the resulting trouble will be all his.

In Review of Franklin Automobiles

Air-Cooled Models Crystallized and Amplified

From the information available, it would appear that the Franklin air-cooled motors have reached final form, and the prospects for the coming year are confined to the types of automobiles that have done service for the past year, with the understanding, of course, that the problems of standardization and other details as suggested by experience have been given a fair measure of attention.



INCLUDING freight automobiles, the product of the Franklin Automobile Company, of Syracuse, N. Y., represents fifteen purchaser's options, six of which belong in the commercial line. Confining the discussion here to the passenger automobiles, it is pointed out that the nine options involve the use of four sizes of power plants, all of which are air-cooled. In the makeup of these power plants two of the sizes of motors are equipped with six cylinders and the remaining power plants are of the four-cylinder type.

In discussing the mechanical equipment of these cars, it will be necessary to single out a limited number of examples of the work, but in doing so it will be with the understanding that the main idea of the Franklin company in the carrying out of its air-cooled work is adhered to with tenacity in all of the designs of the motors, so that in presenting illustrations of motor designs, the reader may take it for granted that the same plan obtains at every point.

For the purpose of showing the general appearance of Franklin cars, Fig. 1 of the Model M touring car is given. This automobile has a four-cylinder, 25-horsepower motor, and the body of the foredoor type is designed to accommodate five passengers. The main differences in the body work are in view of the service to be rendered in each case, and beyond stating that the quality of the body work is on a high plane, with excellence of upholstery and detail, this phase of the matter will

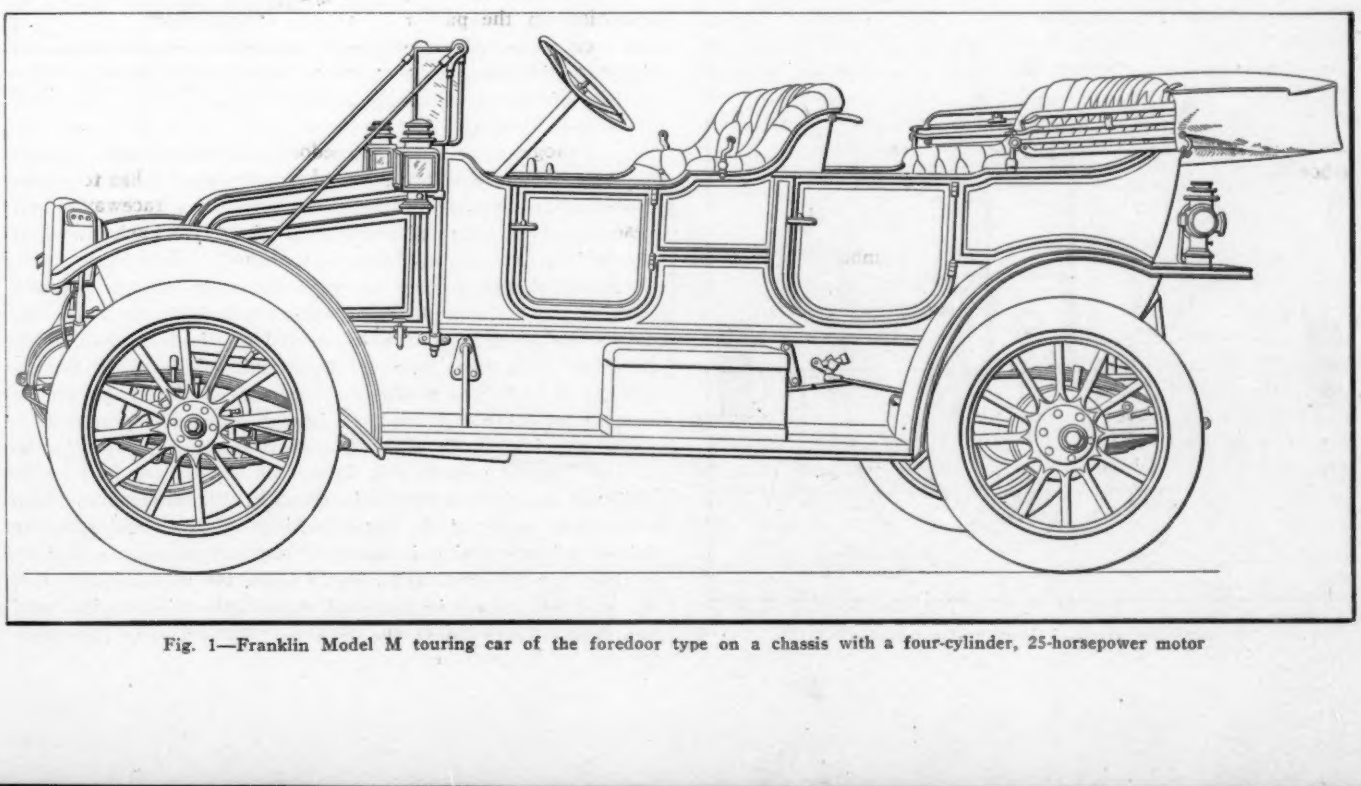


Fig. 1—Franklin Model M touring car of the foredoor type on a chassis with a four-cylinder, 25-horsepower motor

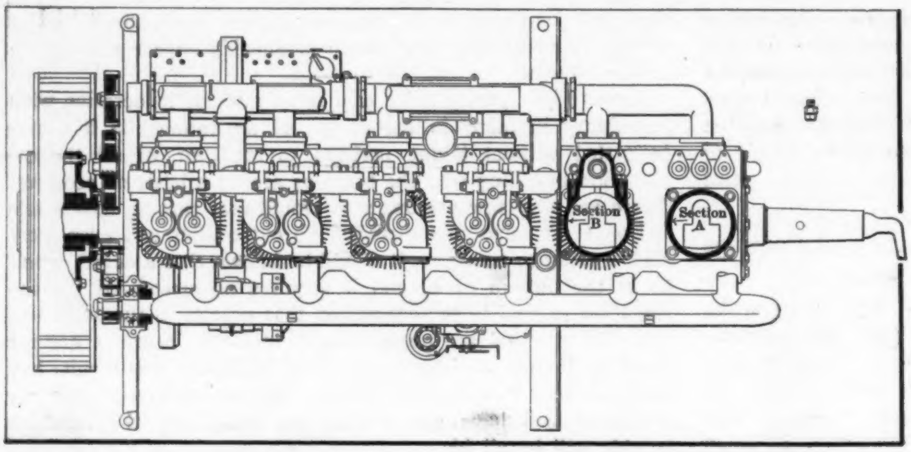


Fig. 2—Looking down on the six-cylinder type of motor showing two of the cylinders in section

be retired, with the simple addition bearing upon the easy riding qualities of this make of cars, due to the use of laminated wood side bars in the chassis construction, and to full elliptic springs for the suspension, they being set out of the horizontal plane, the angle being such as to interpret the diagonal loading, which is the normal expectation when an automobile is going along the road, whereas the static responsibility that obtains when an automobile is standing still is disregarded in the setting of the springs.

Discussing Franklin Practice and its Influence upon the Mechanical Equipment

By referring to Fig. 2 of the six-cylinder motor, looking down upon the same, the arrangement of the six individual air-cooled cylinders will be seen, the last two cylinders being sliced off to show the section through A and B, indicating the thickness of walls and the spacing of the cooling members, they being of steel cast integral with the cylinders, and by a special process in the foundry, the contact of the cooling members with the gray iron of the cylinder castings proper is so intimate that the transfer of heat from the cylinder walls to the surfaces of the cooling members is unimpeded. In this illustration the flywheel is cut away in order to show the housing of the clutch within, and to bring out the fact that the responsibility of the last main bearing is limited to the confines of good practice, which is brought about by locating the flywheel close to the front hanger of the motor.

In Fig. 3 the motor is shown in section, and it will be seen how the motor arm is supported on the laminated wood chassis framing, with angle iron supports upon which the arm bears at its extremities. This section of the motor indicates the location of the supernumerary valve; it also shows the position of the spark plug in the cylinder, and it points to the adjustment at the bearing of the rocker arm, there being one for each valve, and attention is called to the hand-hole cover along the side of the crankcase, by means of which access may be had to the working parts for inspection or repair. Transferring the attention for the moment to Fig. 8, which is a side elevation of the six-cylinder motor with one cylinder sectioned to show the nesting of the valves, also the piston and rings, the piston pin is seen held in place by a through bolt, and attention is called to the lock nut used at this point, it being the idea to prevent the piston pin from going adrift and floating out with the disastrous result that would contribute in this eventuality. The second cylinder is sectioned through the supernumerary valve on the exhaust side, showing how this valve operates, and in view of the fact that over 70 per cent. of all the exhaust products goes through this valve, it is not too much to say that it is a detail of moment in the operation of the motor. The camshaft shows in this section, and the end bearing, which is brought into view, may be taken off without disturbing the rest of the motor, and if it is so desired, the camshaft may be pulled out through the opening so formed. The crankcase is of peculiar construction, offering a substantial support for the main bearings and forming natural oil pockets, thus fixing the level of the lubricating oil, preventing it from surging from one point to another under the impetus of changing speed or when the automobile is negotiating a grade. The support for the starting crank is of substantial design and construction bolted to the front end of the crankcase. The jaw clutch of the crank spindle as it engages the stub end of the crankshaft is encased and oilways are cut in the crankshaft with leads to furnish the lubricating medium to the starting crank end with provision to exclude foreign matter. The oil reservoir is formed in the bottom half of the crankcase, to which attention is called in this illustration. Mention is also made of the large bearings of the rockers, and at various points mention is made of the locking means that are provided for the studs and nuts of bolts, the idea being to indicate that refinement in point of detail is carried to its legitimate limit. Glancing at the flywheel the air vanes are indi-

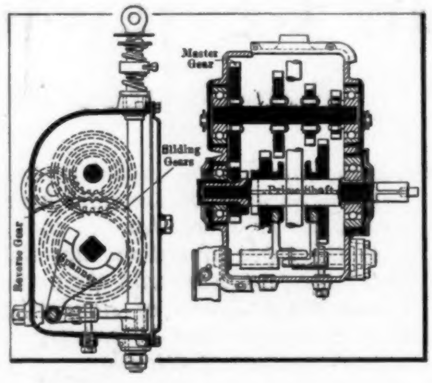


Fig. 4—Section through the transmission gear showing the method of fastening the gears on the shaft

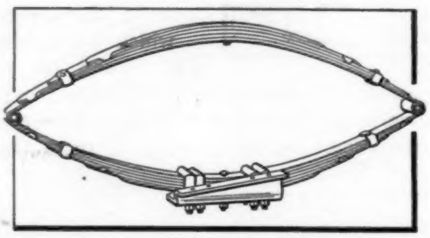


Fig. 5—Full elliptic spring which is used at the front and rear in the suspension of the chassis

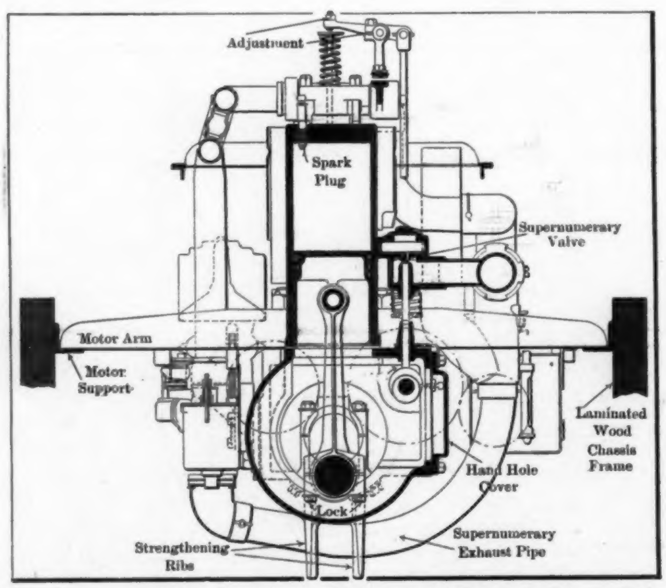


Fig. 3—Cross section through a cylinder showing the location of the auxiliary valve and the plan of suspension

cated, they being in the rim, and remembering that the cylinders are encased with air conduits leading to the flywheel, it will be seen how the air is pulled through these conduits, coming in from the front and thrown off on the periphery of the flywheel. This air is permitted to absorb heat from all of the surfaces on the cylinders, and coming in cool it passes out heatladen, thus affording the requisite cooling influence.

How the Motor Delivers Its Power to Point of Contact of Road Wheels

Transferring the attention to Fig. 6 for the moment, an enlarged detail of the flywheel in section is given, showing the multiple-disc clutch housed within the same and a stout spring of somewhat unusual construction which presses the discs into engagement when the motor is propelling the automobile along the road. A universal joint is incorporated into this system, and means for oiling are provided at points of vantage, rather with the expectation that the lubricating medium will serve (a) as the film between journals and bearings (b) sealing the parts against foreign matter and (c) as insurance.

From the motor through the flywheel and clutch to the transmission gear, as shown in Fig. 4, is the normal course of the torquing effort, and referring to the section of the transmission gear, as given in Fig. 4, attention is called to the details of construction, showing a square prime shaft for the sliding gears, the same being unusually short, and of suitable diameter, so that the thrust of the gears as it tends to spring the shaft is substantially annulled, and the freedom with which the gears are shifted is in nowise interfered with in this quarter. Referring to the layshaft and the gears thereon, it will be seen that they are fastened by rivets, and in the shaping of the gears the webs are left unusually thick for the purpose of preventing warping during heat treatment, and in this way silence of performance is brought about. The relations of the gears are shown by dotted lines in the accompanying end view, and how the reverse gear is brought into play is indicated by its position. Before departing from this illustration attention is called to the shape of the spanner which is used in the sliding of the gears, and to the fact that it is of considerable width and so fashioned as to resist with certainty the strains that come upon it.

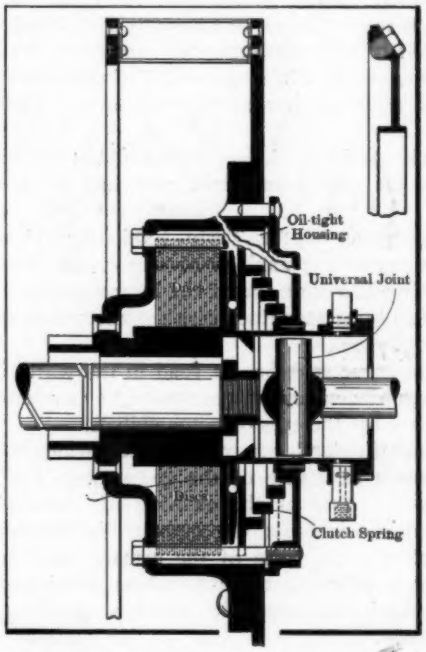


Fig. 6—Section through the flywheel showing the nesting of the clutch and means for pulling air through conduits around motor cylinders

From the transmission gear through the propeller shaft to the live rear axle brings the torquing effort to the members, as shown in Fig. 9, of the live rear axle in section, showing the bevel drive with radial-type ball bearings on both side of the pinion with a thrust bearing back of the latter to resist the endwise effort. The differential gear is of the all-spur gear type in a housing that also floats on radial-type ball bearings, and the road wheels, taking their power through square ends of the jackshaft members, rotate on Timken short-series, conical roller bearings. Grease cups are placed at points of vantage and the full-elliptic springs are fastened to perches on the underside of the axle tube.

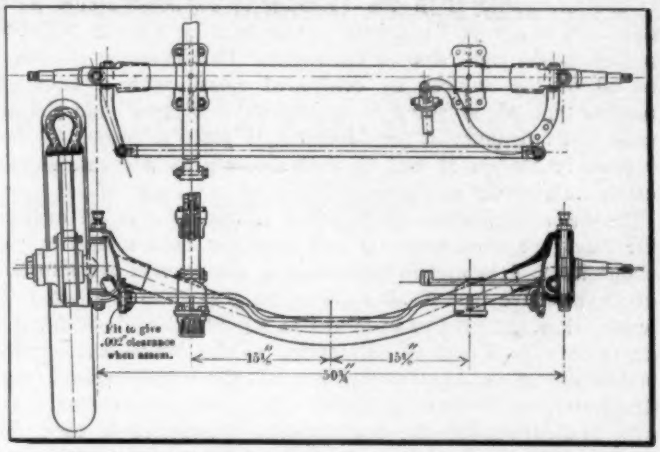


Fig. 7—Two views of the tubular front axle showing details

The front axle is shown in Fig. 7 in two views. It is of the built-up type, and tubular. The method of fastening the springs is the same in the front axle as for the rear and one of the springs is shown in Fig. 5. As a further indication of the wise use of annular-type ball bearings and of thrust bearings where the nature of the work indicates that they should be employed, attention is called to Fig. 10 of the steering gear which is of the worm-and-wheel type; moreover, the use of grease cups is here brought out, showing that it is the idea of the maker to prevent rapid deterioration of the automobile and to retard the coming of noise by furnishing an oil buffer, even in the little joints which will rattle in time, notwithstanding the use of fine material, confining the machining efforts to narrow limits of tolerance unless lubricating oil is the film at every joint.

Other Points to Interest Purchasers

Referring to the motors again, the Model G car is fitted with an 18-horsepower motor, the same having four cylinders with a bore of 3 3-8 inches and a stroke of 4 inches. The Model M car is fitted with a 25-horsepower motor, the same having four cylinders with the bore and stroke set at 4 inches. The Model O car has a motor rated at 38 horsepower, the motor having six cylinders with a bore and stroke of 4 inches. Model H is a six-cylinder car with a 4 1-2-inch bore and 4 1-2-inch stroke.

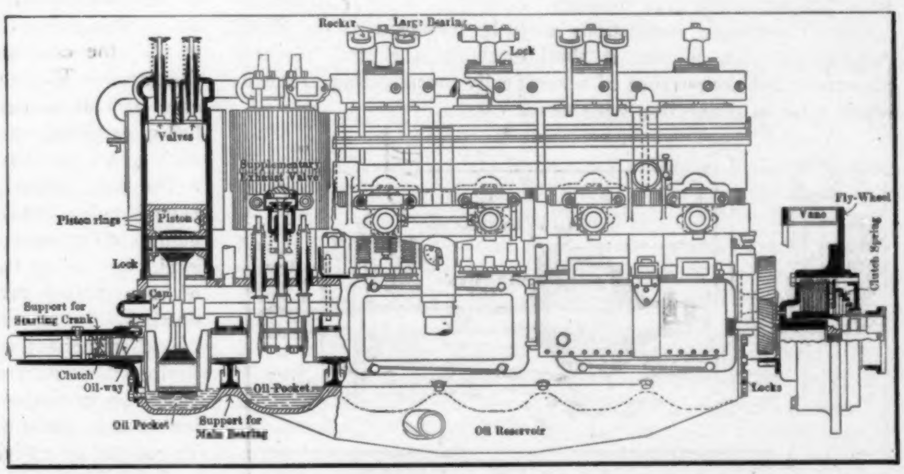


Fig. 8—Side elevation of the six-cylinder motor showing the valves in the head, details of the piston and the oil pockets in the bottom of the case

The carbureter is of the Franklin make, substantially as it appeared in last year's models. Ignition is by a Bosch magneto placed on the right side of the motor. Lubrication is the same in all of the models, by controlled splash with a Hancock plunger-type of oil pump to maintain the oil level, and the oil tank holds 10 pints in the Model H, 8 pints in Model O, and 7 pints in Models M and G, thus assuring an adequate supply of the lubricating medium.

In the multiple-disc clutch, which is the same in all models, the discs are alternate steel and phosphor bronze, and in the transmission gear system three speeds and reverse are afforded of the selective type in all cases. The gear ratio is 3 5-17 to 1 in Model H, 3 11-15 to 1 in Model D, 3 5-7 to 1 in Model M, and 4 3-13 to 1 in Model G. Referring to the brakes the service brakes are of the constricting type on the transmission brake-drum and the emergency brakes are of the constricting type, with brakedrums on the rear wheels. Raybestos is used for facings. The road wheels are of the artillery type with twelve spokes of hickory for the front and rear, and the quick-detachable rims are fitted with tires of the Goodrich make, the sizes being as follows: Model H 38 x 5 1-2 rear and 37 x 5 front; Model D, 37 x 5 rear and 36 x 4 1-2 front; Model M, 34 x 4 1-2 rear and 34 x 4 front, and Model G, 32 x 4 rear and 32 x 3 1-2 for the front tires. These automobiles weigh, considering the stripped chassis, 3,300 pounds for Model H, 2,800 pounds for Model D, 2,300 pounds for Model M, and 1,850 pounds for Model G. The wheelbase of the Model H car is 133 inches, Model D 123 inches, Model M 108 inches, and Model G is 100 inches. The tread is 56 inches for Models H and D, and 53 1-2 inches for Models M and O. The weight, including the bodies, will, of course, depend upon the types of bodies as selected in each case. In conclusion it is pointed out that the large diameter wheels with tires of considerable section, considering the diameters, coupled with the use of full-elliptic springs and a laminated wood chassis frame, carries out the plan of the designer, which is in the direction of smooth performance and a minimum tire bill.

Items From Foreign Lands

Interesting extracts, mainly from the United State Consular Reports, in which the status of the automobile in foreign parts is tersely set forth, and the prospects of extending the American market are called to the attention of those interested.

IN many sections of England road patrols have been organized, the members of which make it a point to render first aid in the event of any injury to automobilists.

The Scottish Automobile Club comprises 1,698 members. The clubhouse is valued at $50,000, and there is a surplus fund of about $18,000 in the club treasury.

One of the latest suggestions made by members of the Royal Automobile Club is that it shall establish a central research laboratory for the purpose of scientifically investigating problems which arise in connection with motor cars.

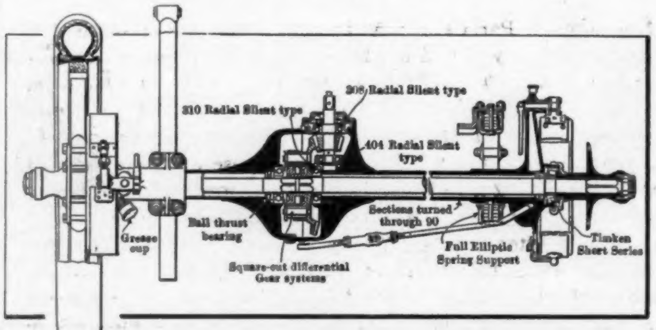


Fig. 9—Live rear axle of the full floating type, also the differential gear and bevel drive floating on annular type ball bearings

King George V evinced his desire to encourage the practical use of automobiles by his act in extending his royal patronage to the Fifth Annual Parade of the Commercial Users' Association, which took place on Whit Monday, June 5, at Shepherd's Bush. It was intended that the parade should take place at the Crystal Palace, but the fact of insufficient space necessitated the change.

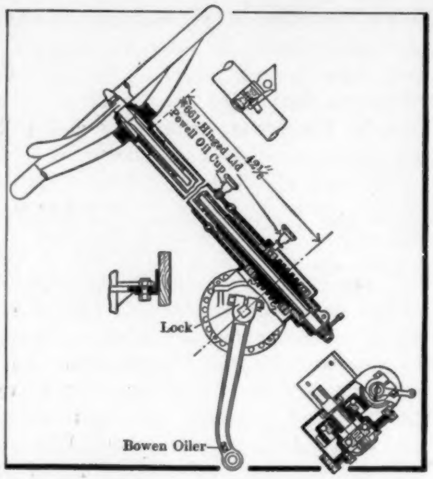


Fig. 10—Section of the steering gear showing the use of annular type ball bearings and a thrust bearing behind the worm

Automobilists who have recently passed over the coast road from Genoa to Rome, between Spezia to Crosseto, Italy, report the condition of the road to be in a disgraceful condition. As a substitute for this route, certain clubs are advising their members to motor over the road which runs by the way of Lucca-Florence-Siena.

The Automobile Club of South Africa is the oldest of the British Colonial clubs. It was founded in 1901 and is in a flourishing condition.

The automobile department of the Turin Exhibition which opened April 29, while containing exhibits of motor cars from many countries, was obliged to allot one of the largest spaces to England, there being forty-one manufacturers represented from that kingdom.

Among the most picturesque stretches of road in the world is that which runs through the valley of the Rhine in Germany. Its scenery affords a feast for the eyes of automobilists.

During the Brooklands, England, automobile races, which are now claiming the attention of lovers of the sport, one of the most conspicuous figures is that of the ex-King of Portugal.

One of the most unique sights to the automobilist touring through India is the philosophic poise of the camel's head, as he stands by the roadside watching the automobiles glide past. His eyes seem to be fired with the expression which seems to say that his occupation is gone.

The Head Chauffeurs' Club of London issued over 3,000 peti-from their drivers' licenses. This spirit is characterized as not cancellation of endorsements of chauffeurs' licenses as an act of grace in celebration of the Coronation. It is significant that the owners of machines express themselves as being quite as anxious as the chauffeurs themselves for the endorsements to be removed from their drivers' licenses. This spirit is characterized as not at all surprising on the part of employers who wish to retain the services of a reliable chauffeur, as many chauffeurs' fines in case of trouble occurring, and which, in the event of licenses being endorsed, are large in proportion for specific offenses with which the drivers are charged.

The body related to the Royal Automobile Club, known as the Dust Roads Committee, has demonstrated itself as a very useful public utility servant in the interest of automobilists in England. One of its functions is that of suggesting various methods of constructing roads which will prove not only durable but dustless.

A Birmingham, England, inventor has turned out an electrical device whose purpose is to illuminate the taxicab at night. The design is such that as the driver drops the "hire" flag, a light is instantly switched on, which lights up the dial of the meter. This light is sufficiently strong to enable the occupant of the taxicab to keep an accurate account of the mileage as the motor rolls along.

When Judgment Whispers Don't

A Series of Abbreviated Injunctions

DON'T sand-paper the ideas of the men who are trying to deliver results for you, and when the project goes wrong in consequence, put the blame on them.

DON'T assume that men know what you want—tell them of your aspirations and let them deliver the results.

DON'T skimp at the end of the construction period in the plant—your reputation is present all of the time.

DON'T make believe that you are in the automobile business if you follow the practice of accepting second-hand cars for new automobiles.

DON'T hope to succeed if you are building something for which there is not a direct demand.

DON'T invent complications and then try to create a demand for them—it is more to the point to make things for which there is a call.

DON'T chase fortune over a precipice—if it is in the form of a good car and swift, why not treat it with consideration?

DON'T place reliance in "bottled moonshine" as it is doled out by the man who says that "nameless" tires are as good as the other kind.

DON'T go on the assumption that a thing is valueless unless it performs a utility service—as Lowell remarked, it means, "extinction to the rose and triumphant success to the cabbage."

DON'T be disturbed if there are more places for plumbers than there are for prophets—the leaks have to be stopped up; even so, sanitation of the mind makes a plumber out of the prophet in a sense.

DON'T trump up the charge that no amount of philosophy will furnish the price of a dinner—the thinking mind foregoes the pain of indigestion.

DON'T put your soul into your business—it might go down in the swirl of bankruptcy.

DON'T be dismayed if the riff-raff bows itself out—success is gauged by the distance that envy betakes itself away.

DON'T encourage a termagant automobile—get a divorce, or, better yet, balk before the entangling alliance is made.

DON'T make cronies of useless contraptions that beset the path of the unwary.

DON'T let the effulgence of the salesman make your mind's eye blink and eclipse your senses.

DON'T agree to an embossed price for a dilapidated automobile.

DON'T try to make a good automobile out of a poor idea; it is an endless pursuit.

DON'T gorge your mind with thoughts of pleasure to be derived by swapping a mortgage for an automobile.

DON'T embark in a business that promises to sully a hard-earned reputation.

DON'T place reliance in a swivel story uttered by a knave.

DON'T yawn money out of your purse when the salesman yawns for it. It may be sympathetic to do so, but the business of the hour is to get a good automobile.

DON'T take "no" for an answer; you must sell your output or the receiver will pay a friendly call!

DON'T do business on a Spanish basis—mañana (to-morrow) never comes; insolvency threatens!

DON'T put off the sale of the models that are apparently not seasonable—it is the salesman who is out of season; it may be a failing with him.

DON'T fail to "liquefy" your product; it is not an impossible thing to do; there is a foot for every shoe.

DON'T dribble out money in useless advertising; your prospectives read the daily papers; use them. If you hope to reach men of intelligence place your copy where it will be seen.

DON'T use word-puzzles in your copy; life is too short to take any time trying to unravel the skein of the copy-writer who is merely trying to strain the dictionary.

DON'T try to make a favorable impression in an unfavorable place—it is like applying for a position as bank cashier in a bar-room.

DON'T give a car to a prominent citizen hoping thereby to get him to influence his friends. If you make a good automobile he will like it better if he pays for it. If he gets a car for nothing his friends will know about it the very next day.

DON'T plot with yourself against your customer; he is the man who is to assure your dividend.

DON'T allow your salesman to take liberties with your customer; you must suffer the consequences, not he!

DON'T spike your best guns, as you will if you allow a dissatisfied customer to remain a victim of discontent; cure his disorder.

German Makers' Good Year

Sales increased and the prices obtained were generally better than in former years. Exports increased about 65 per cent. over 1909, while imports remained practically the same.

THE German automobile trade in 1910 was distinctly good. Sales of motor car, accessories, and tires for home consumption and for export increased, especially of the lower-grade cars, and prices were more remunerative. According to the official statistics, the total number of motor vehicles in use in Germany for passenger and for industrial purposes on January of the five past years was as follows: 1907, passenger, 25,815; industrial, 1,211; 1908, passenger, 34,244; industrial, 1,778; 1909, passenger, 39,475; industrial, 2,252; 1910, passenger, 46,922; industrial, 3,019; and 1911, passenger, 53,478; industrial, 4,327.

	Value of Imports.		Value of Exports.	
Automobiles.	1909	1910	1909	1910
Passenger	$2,155,328	$2,263,856	$4,065,754	$6,930,560
Commercial	142,086	193,018	384,846	627,368
Total	$2,297,414	$2,456,874	$4,450,600	$7,557,928

Some Humors of French Touring.

If you are in Paris and wish to take a spin in an automobile out to Versailles, you will be able to make it within the space of three hours and a half. After leaving Paris, three or four miles out, you will no doubt be stopped by an official who proceeds to examine your automobile. He will give the excuse that he is examining your motor car for the purpose of ascertaining if your gasoline tank contains a sufficient amount of gasoline to justify him in levying the tax upon it. A bit farther along on the road as you enter a village you will be approached by another officer who comes out and peeps under the seat with the explanation that he wishes to see if there is any danger of a breakdown. You will open your eyes when the chauffeur tells you that in both cases the official was looking for smuggled goods, especially garden products or eggs into another department.

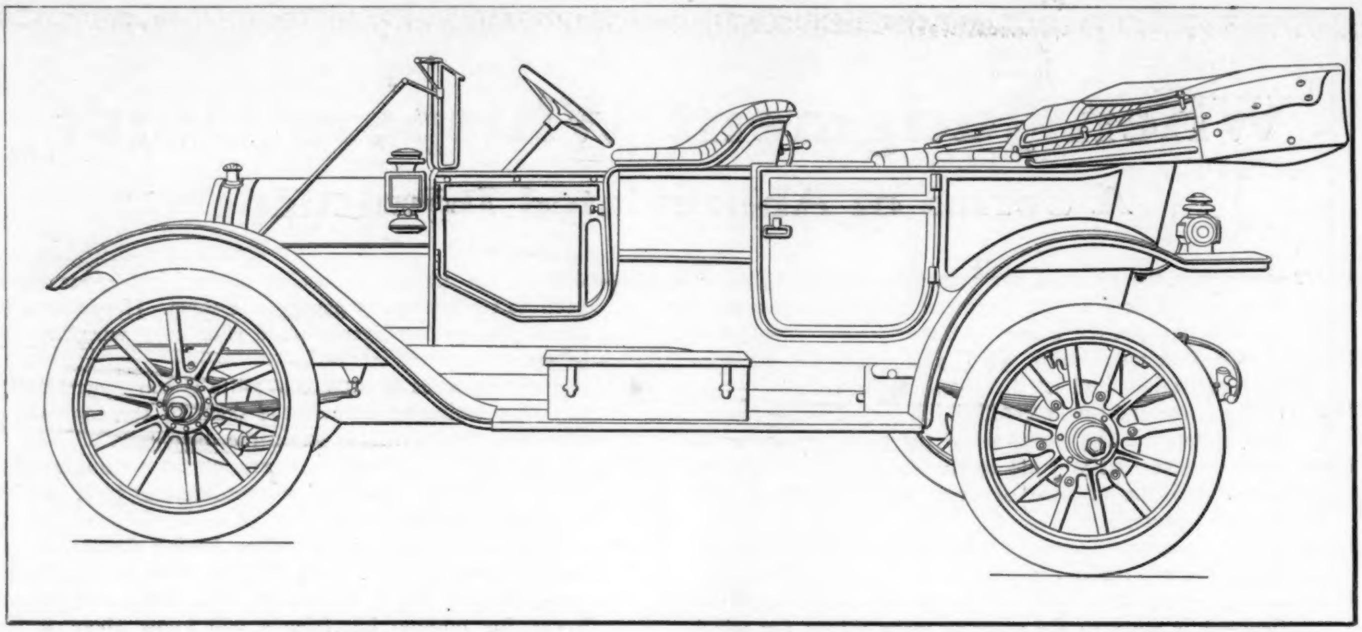


Fig. 1—Chalmers "30" touring car of the fore-door type with top and windshield and usual accessories in complete form

Present Activities in Chalmers Plant

"30" and "40" Models Will Be Continued

Beyond the refinements of the latest and most approved character, the activities in the Chalmers plant will be in the nature of a continuation of the "30" and "40" Models of cars, and the illustrations given in this article include half-tones from photographs of the new pressed steel live rear axle, which is looked upon as an engineering achievement of no mean proportion. The effort on behalf of the Chalmers engineers to obtain the best current result is exercised with the same care throughout the car as this live rear axle undertaking naturally indicates.

RECOGNIZING the impracticability of showing in precise detail the ramifications of all the designing efforts that are continually being made in an establishment of this proportion, the attempt here will be confined to a concise engineering review of the main features of the Chalmers "30" car, with sufficient reference to the "40" model to bring out the relation that it holds to the general plan of the Chalmers Motor Company at Detroit, Mich.

Referring to Fig. 1 of the Chalmers "30" touring car, the body is of the foredoor type in straight-line effect, and the motor, being relatively short, permits of the placing of the dash well in the direction of the front of the car so that the foredoor which swings to the front is of excellent width, and the entrance is unobstructed by the flare of the mudguards or other impediments. Looking at the side entrance to the tonneau it will be seen that it is wide and that the door swings to the back against the mudguard, and in the light of this excellent plan it may also be observed that the width of the entering space is adequate for the need. A well-contrived top is fitted to the body, and the windshield, of the folding type, takes on a

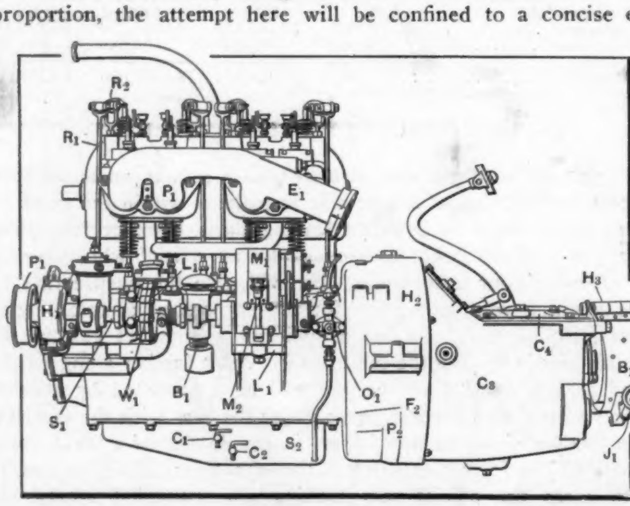


Fig. 2—Left-hand side of Model "30" motor, showing a unit type of power plant with the magneto and water pump driven by a common shaft

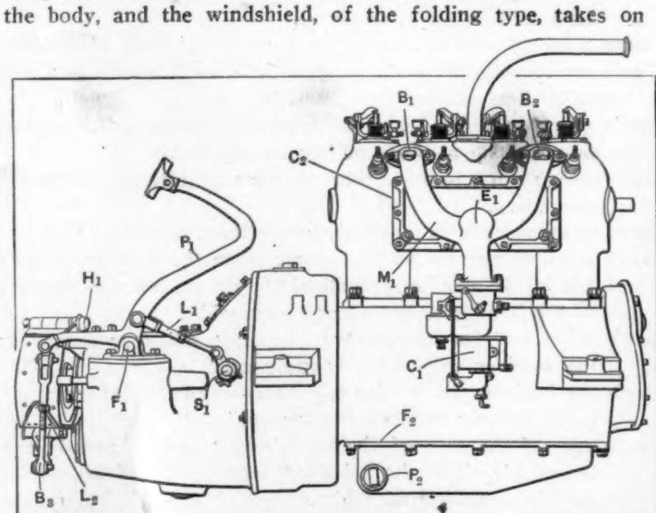


Fig. 3—Right-hand side of the Model "30" motor, showing the Mayer type of carbureter on a special form of manifold

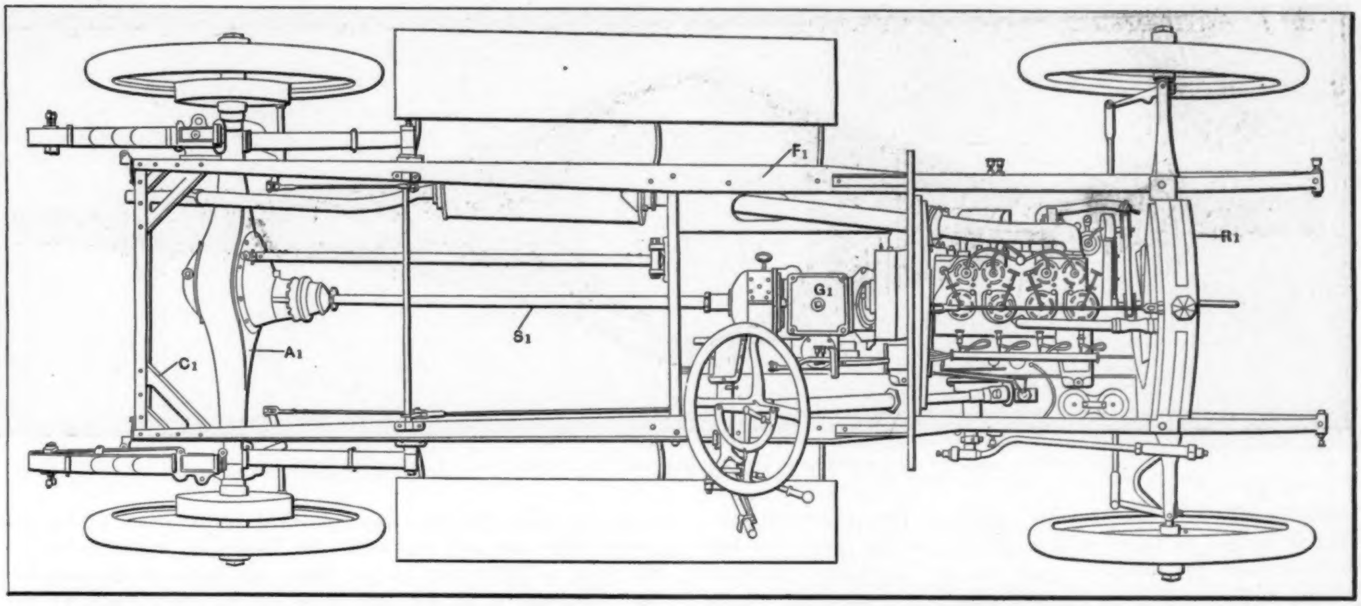


Fig. 4—Plan of the Model "30" chassis, showing the location of the power plant, long propeller shaft, and thrust steel live rear axle

neat appearance, conforming to the general design, and its position on the dash lends effectiveness to its use.

Referring to Fig. 2 of the left-hand side of the Chalmers "30" motor, it will be seen that the cylinders are of the block type. The motor is rated at 30 horsepower by the company. The cylinder bore is 4 inches and the stroke is 4 1-2 inches. The motor is of the water-cooled type, working four-cycle, and the block includes four cylinders. The radiator is of the vertical tube type and the centrifugal water pump W1, which is used to circulate the cooling water, is located on the crankcase back of the front arm, and is driven by the shaft S1 from a gear in the housing H1, the same shaft protruding through to the front, carrying a pulley P1 which takes a belt for the fan drive.

Ignition is by a Bosch DU4 dual magneto system, located on a ledge L1 with a magneto M1 held in place by a quick detachable fastening mechanism M2. The breather B1 comes up through the crankcase between the water pump and the magneto, and the lubricating oil in the sump S2 is circulated by the gear type of oil pump O1 through the piping system in the manner as shown. The oil level is established by a tell-tale oil cock C1 and oil is drained out of the reservoir through the draincock C2. The exhaust manifold E1 is flanged to faces on the block casting of the cylinders with the holding bolts brought out in the open so that the manifold may be unbolted and put back into place most readily. The valve mechanism, including the rods R1, come up through the crankcase on the left-hand side of the motor, and are yoked to rockers R2, the latter being fulcrumed near the middle, so that the extremity of the yoke opposite the actuating end engages the end of the valve stem, imparting motion thereto in response to the rocking of the arms. The flywheel is in the housing enlargement H2, and the transmission gear is in the case C3. Accessibility to the gearcase is obtained through the cover C4, and the differential brake B1 is hinged H3 at the tops, with the actuating motion at the bottom, and a quick adjustment J1 is provided.

Carbureter Is Located on Right Side of Motor

Referring to Fig. 3 and the carbureter C1 on the right side of the motor, it will be observed that the manifold M1 of the same has a straight uptake terminating in a spherical enlarge-

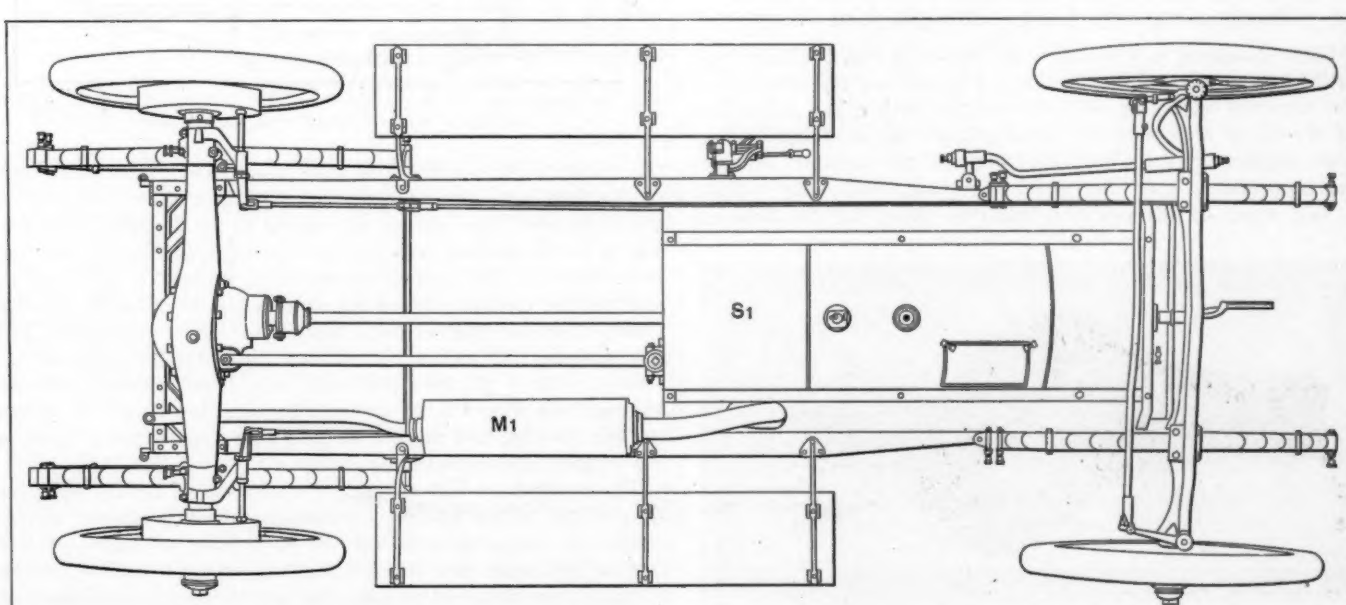


Fig. 5—Bottom view of the Model "30" chassis, showing freedom from inaccessible parts and a protective sod apron

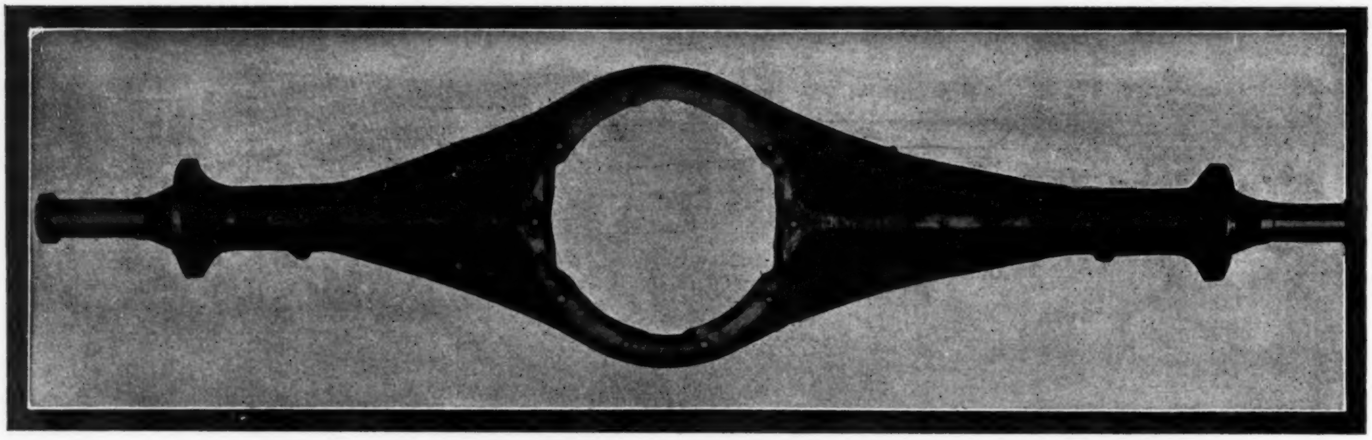


Fig. 6—Rear view of the pressed steel axle housing with the bevel drive and differential set removed

ment E1 with two branches B1 and B2. The carbureter manifold is flanged to faces on the cylinder casting, with a straight lead through the transfer ports to the combustion chambers within, and remembering that the manifold is essentially a part of the carbureter, and that the transfer ports are water-jacketed, it will be seen that the entrained globules of gas in liquid form are given opportunity to absorb heat from the surroundings, and the mixture of air and gasoline as it enters the combustion chamber is rendered in a dry state. This side of the motor shows the fulcrum S1 of the pedal P1, and the link L1 connecting with the clutch yoke-shaft S1, also the arm A1 to the link L2 of the brake mechanism B3. Looking at this side of the motor shows a drainplug P2 which may be removed to clean out the oil reservoir, which is bolted at the flange F2 to the lower half of the crankcase, and in the cylinder construction water jacket covers C2 are provided, it being the idea to facilitate the casting of the cylinders, remembering that gases form during the teeming of the metal, and unless these gases are permitted to escape they will penetrate the molten mass and make it "soggy." There is evidence in this plan of the fact that the block castings of cylinders require the working out of a suitable process whereby the cones will stay in their proper places and the gases will go away, thus leaving the metal free to solidify, making the walls of uniform thickness throughout, keeping "sullage" away from the valve seats and the cylinder walls, and in other ways affording castings that will clean up and present the texture that is desirable in this type of service.

Chassis Assembly Shows Straight Line Work

Clean designing is a conspicuous feature in the Chalmers "30" as it has been revised for 1912, and Fig. 4 shows the relations of the members beginning with the radiator R1 on the center line of the front axle with the four-cylinder self-contained power plant supported by the side bars back of the radiator, bringing the transmission gear just under the front footboards, making a long reach of the propeller shaft S1 from the transmission gear G1 to the live rear axle A1. The construction of the side bars is keen and well fashioned, the flanges F1 being widened at the point of narrowing of the frame just back of the dash line, and the tying in of the rear cross bar at the corners C1 presents excellence of detail.

Referring to Fig. 5 of the bottom view of the chassis, it will be seen that the sod apron S1 protects the machinery equipment from the radiator to the back of the transmission gear, and the muffler M1 is placed just back of the break of the sod apron in line with a side bar with easy curves of the exhaust piping from

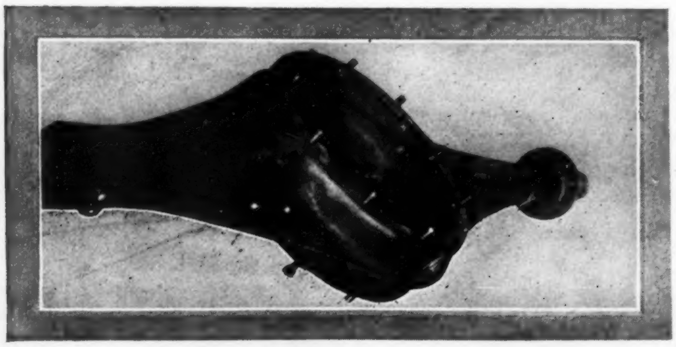


Fig. 7—Pressed steel housing of the rear axle in perspective looking into the cavity that is formed out of the metal for the holding of the mechanism

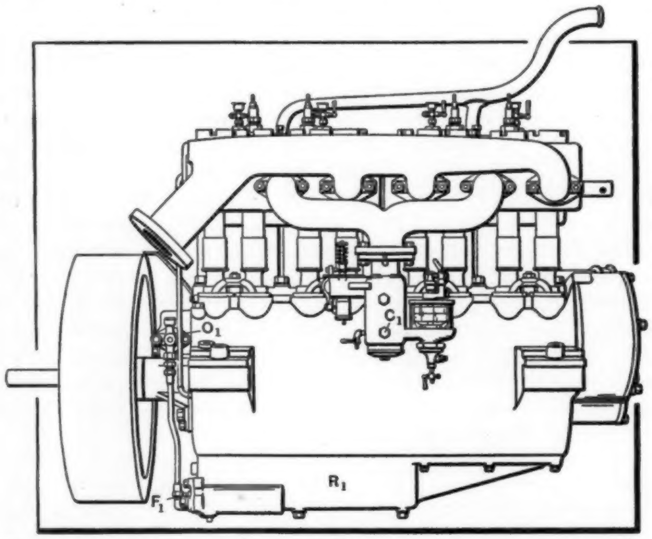


Fig. 10—Right side of the Model "40" motor, showing the Stromberg carbureter and the location of the oil pump

the motor to the muffler, and from where away to a point back of the rear cross bar. In other respects the clean appearance of the underside of the chassis will appeal to the discriminating eye. Fig. 5 shows the live rear axle as it rests in the chassis, but the importance of the plan of construction utilized is sufficient to warrant the reproduction of the axle details in order to afford a better understanding of the strength of this construction, and Fig. 6 shows the axle complete with the differential gearset removed. Fig. 7 presents the same axle from another point of vantage, and Fig. 8 is of the axle looking down upon it, showing the flanging and method of fastening the machinery part to the pressed steel construction.

Those who have had experience with some of the earlier types of live rear axles, and who understand the mischievous significance of a sagging axle will see by looking at Fig. 9 of one end of this axle that the bearing supports S1 outside of the flange F1 are designed to carry the whole load, and the idea of sagging is completely eliminated, due to the flaring F2 of the shape of the pressed steel members, and to the strength of the

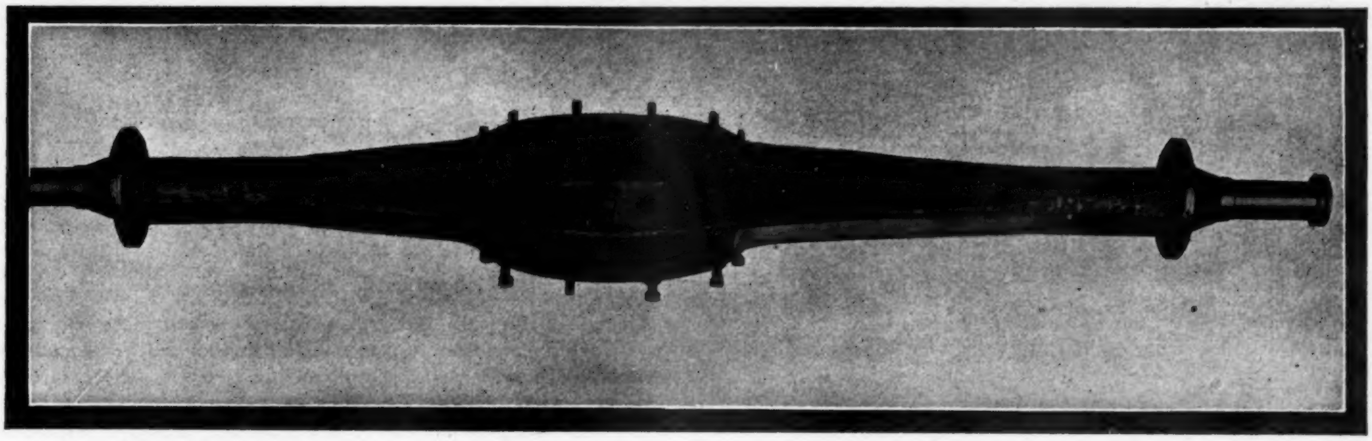


Fig. 8—Looking down on the pressed steel live rear axle, showing the joint in the vertical plane which is welded together by the autogenous process

tube-like structure with its integral expanding shape, and the great strength involved. The ills that attend loose parts and the hazards involved in casting work are done away with.

Chalmers "40" Has Individual Points of Merit Consistent With Larger Power and Greater Speed

While it is not the purpose here to extend this article to include a detailed description of the "40" model it will be the

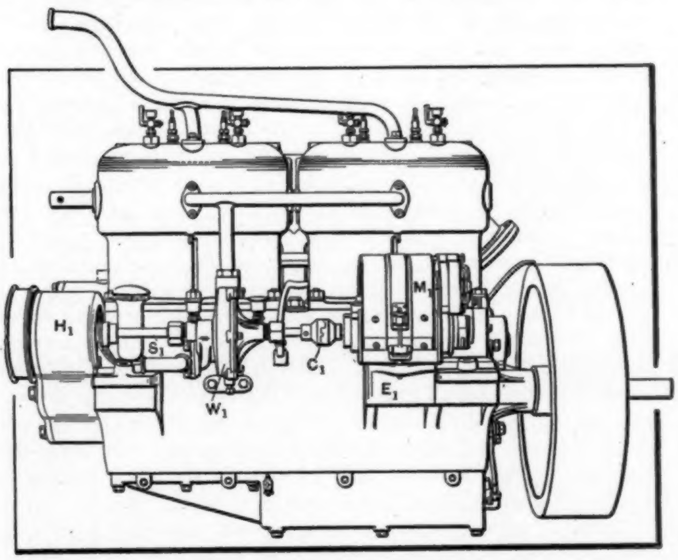


Fig. 11—Left side of the Model "40" motor, showing the magneto on a ledge driven in common with a centrifugal pump by a shaft out of the half-time housing

purpose to show by actual illustration that the broad engineering basis on which Chalmers construction rests has had its marked influence upon the "40" model, and that the greater measure of power and the increased speed resulting has been the inducement for deviations in design and construction that would not of necessity obtain in the "30" model. Fig. 10 shows the right side of the "40" motor with a Stromberg carbureter C_1 in the mid-position, and the oil pump O_1 fastened to the crankcase at a point near the flywheel. Oil passes out of the reservoir R_1 through the fitting F_1 and is circulated by the pump, flooding the bearings of the motor, affording positive lubrication, and the used oil, after having been strained, is delivered back to the reservoir.

Referring to Fig. 11 of the left side of the model "40" motor, the centrifugal pump W_1 is shown back of the front motor arm, taking its drive by shaft S_1 from a gear in the housing H_1, and the shaft passing through the water pump to the coupling C_1 drives the magneto M_1, which is placed on an extension E_1 of the crankcase. The cylinders of the motor are cast in pairs, and attention is called to the clean design, symmetry of shape, as well as the nice details of piping and other parts.

The general features of the two models of cars are substantially in accord with the 1911 work, including a cone clutch on the "40" and a multiple-disc clutch on the "30." Both models are fitted with a selective type of transmission gear, affording three forward speeds and reverse. In the Model "40" plant the transmission gear is a separate unit placed amidship. The control levers are on the right side in all models. The ratio of the bevel drive is 3 1-2 to 1 in the Model "40" and 3 3-4 to 1 or 3 1-2 to 1 in the Model "30." The emergency brakes are in the rear wheels of the expanding type with thermoid facings and controlled by a side lever. The service brakes are on the transmission and of the constricting type, interlocking with the clutch pedal in the "30" model and controlled by the right hand of the two pedals in the "40" model. The rear springs are three-quarter elliptic in both models, and semi-elliptic for the front springs, likewise in both models. The front axles are of the I-section with Elliott type of knuckles. The tire equipment on the "40" model is 36 x 4 inches all around, and the "30" model is fitted with 36 x 3 1-2 inch tires all around. The wheelbase length in the Model "40" is 122 inches with a 56-inch tread, and the wheelbase of the Model "30" is 115 inches and 56-inch tread. The "30" model is also turned out with a wheelbase of 104 inches, which makes a convenient type of town car with a penchant for taxicab work.

Making Repairs on the Road.—Corners and narrow roads are not the safest places to conduct repairs in. Neither should a tonneau door be allowed to remain open nor tools be scattered over the road. Place the tools needed for the particular work on the running board, and as each has been used return it thereto. In all cases the autoist should place the change gear lever in the neutral position and set the hand brake before leaving the seat. Accidents caused by the car running down the driver when cranking will thus be prevented.

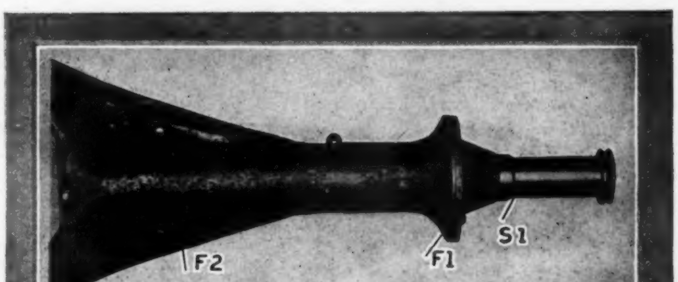


Fig. 9—Looking at one end of the pressed steel member of the live rear axle, showing the journal, flanged joint and excellence of proportions.

It Stands to Reason—

(Remembering That the Exception Proves the Rule)

THAT the treatment that is good for rubber is injurious to rubber—when rubber and leather are companions on a tire-case the user must look to his laurels.

THAT washing tires to keep them clean is almost a useless thing to do—to preserve the rubber so that it in turn will protect the fabric is the main idea.

THAT insignificant cuts on the surfaces of tires lead to a new set of cases by the most direct route—the way to avoid this contingency is to fill the cuts as soon as they are made.

THAT it is useless to fill the little cuts on the surfaces of the cases unless the material is vulcanized after it is put in place.

THAT solvents are efficacious for removing matter from surfaces—what is to prevent the solvents from removing the materials under the surface also?

THAT the most important department of a business should not be left to the tender mercies of a man whose sole interest lies in a commission on the value of the space that he can fill with words.

THAT the best description of any device is the shortest and the simplest statement of the use to which it may be put.

THAT an ingenious "word-slinger," if he does not know what he is talking about, is a poor imitation of a man who knowingly falsifies the facts.

THAT the trappings shown on some automobiles must be a suit of woe.

THAT dallying with a frustrated design of a car is no fit joy for even a novice.

THAT a darky has the "torment" when he is ill, and the owner of a jaded rig has the "torment" all of the time.

THAT a token of a maker's acumen is in the form of a well-made automobile.

THAT a titanic reputation made out of the whole cloth by mere publicity will fade away under the light of exposure.

THAT a good automobile will withstand the burning test of time and service, brightening the luster of the maker's reputation.

THAT a happy tenant selects a stout abode—if it is on wheels he takes a second look before he buys a name-plate for his dwelling.

THAT a tacit understanding between the salesman and the prospect is a sure sign of a purchase if the automobile is a good one.

THAT a tabulation of the mistakes that purchasers have made would show that thorghtlessness is the consulting engineer of some of them.

THAT a subtle person is one who can get 10,000 miles out of a set of tires.

THAT suction is normally the property of a pump, but a flaming red color is a good substitute when the color is on the body of a car.

The Motor and the Farm

At a recent meeting of the American Society of Mechanical Engineers a paper on the economic importance of the farm tractor was read by L. W. Ellis, of which the following is an extract.

THE time was when the horse was the servant of man, but the time has arrived when man is the slave of the horse. It will doubtless be to the purpose of the learned coterie of experts who will make this meeting interesting to point the way to better things, showing how little refinements here and there will bring the tractor more nearly up to date, and telling of the educational methods that will have to be pursued in order to get the farmers of this country to think in an up-to-date way.

While the opportunity affords it may not be out of place here to call attention to one or two abuses that will have to be alleviated in the long run. Very few farmers realize that they are the levers by means of which legislators in league with horse interests get in the way of progress. The farmer pulls chestnuts for the legislator, and the latter induces the farmer to do so by making him believe that his bread and butter is being endangered to whatever extent tractors and automobiles take the place of horses.

The cow, as an economic factor, and even the plebeian pig, for that matter, offer to the farmer a double choice. He is permitted to feed grain and fodder to these animals in order that he will be able to sell butter and milk, beef and pork. If the market does not look promising, the farmer has the further choice of selling the grain, or he may split on the proposition, disposing of a quota of each of these marketable commodities.

The reason why the average farmer is hard to convince of the economic value of the machine over the animal is because he has the unfortunate habit of giving his own labor away. If a contractor desires to engage the services of a bricklayer the contractor is smart enough to know that he will have to pay the bricklayer a matter of $7 per day, and the bricklayer has the acumen to understand that his services are worth $7 per day, but the farmer, he who is at the foundation of everything in our form of civilization, fails to appreciate the value of his services, but the horse that he feeds waxes fat. If the farmer will look at the situation broadly, if he will understand that the farmers are feeding 25,000,000 animals, and that they do not get $1,250,000,000 worth of result, if they will awaken to the fact that 2,000,000 average families are enslaved in the very process of feeding these animals, the end will be in sight.

There is nothing difficult to appreciate in relation to these matters. The 25,000,000 animals have to be fed three times a day whether they work or not, and in addition to the feed that they consume, men must care for them, whereas a machine, a tractor or an automobile may be stored away under the roof; when it is out of service it consumes nothing. There is no use of haggling about the details that blind the vision of the man of no scope; certainly the investment has its debit side; interest must be paid upon the principal, and depreciation must be compensated for, but as a broad proposition, the life of a piece of steel exceeds the life of a horse, and the depreciation of wrought metal is far below the depreciation of an animal. As a matter of fact, under equal conditions of care, or let it be said with the same neglect, the automobile or the tractor will be in the garage or some other place of keeping five years after the horse is dead.

ONE CAUSE OF MOTOR "KNOCK"—Knocking on a long grade may be due to increasing compression, attending decreasing speed, coupled with increasing heat, following a diminishing cooling effect, resultant of the influence of gradient in that the power requirement is a maximum. Under such conditions preignition will be the most likely cause of the knocking, but a small flywheel can influence the situation to a vast extent.

The Hupmobile in Its Latest Aspect

Enumerating the Refinements and Changes Made

The present idea involving this make of car is to place at the disposal of users for $750 a refined automobile, including a top with slip cover, zig-zag windshield, mirror lens, headlights with gas generator, oil side and tail lamps, and tool kit. It is the purpose to fit all models with foredoors without extra charge. The output comprises five types, namely, foredoor runabout, or torpedo, and a coupé on the 86-inch wheelbase chassis, while the 110-inch wheelbase chassis may be had in a touring car, and by way of commercial work a delivery wagon is made on the same chassis. As an exception to the rule, the company affords an interchangeable utility type of body in the 110-inch wheelbase touring car type, at an extra cost of $25. In this undertaking it will be understood that the touring body is made removable and the utility body may be substituted, the latter consisting of a platform with low sides and a seat for two.

MADE in Detroit by the Hupp Motor Car Company, the automobiles as described in this article are in the nature of a revision of the last year's work, and the five choices offered to the company's clientèle are in connection with two designs of chassis, one of which has an 86-inch wheelbase, with a 54 or 58-inch tread, and the larger model represents a 110-inch wheelbase with a 54 or 58-inch tread The latest effort of the company is depicted in Fig. 1, of the foredoor type of touring car on the 110-inch wheelbase chassis, showing a long and sweeping body undertaking of the straight line effect, and by way of an innovation, an oval gasoline tank is placed above the platform line back of the rear seat. This placing of the gasoline tank adds to the length appearance of the car, and in view of the fact that gravity feed is used, the head of the gasoline, due to the placing of the tank so high up, is adequate for every need, thus assuring a constant flow of the "gas."

Referring to the 86-inch wheelbase car and to Fig. 2, it will be seen that the general idea involved in the designing is not different from that which obtains in the touring car as shown in Fig. 1, and it is a noteworthy characteristic of this model that the center of gravity of the mass is close to the ground, and this excellent faculty is obtained through the method in vogue involving a spring suspension, thereby saving the ground clearance, which is an important consideration, and referring to Fig. 3 the details of this chassis design are clearly depicted, showing the lateral spring at the rear, the same being swung back of the center line of the axle, with supports radiating from the axle for the same. This idea in spring designing and suspension work has been a feature of the Hupmobile from the start, and its practicability has been proven in actual service. A study of the design will show that it is due to this method of suspending the chassis frame that permits of the low and sweeping effect for which this type of car is noted, and it is this detail that has more to do with the realization of a low center of gravity without interfering with ground clearance than any other design idea involved in the undertaking.

Fig. 3 shows the radiator in the plane of the front axle, and a

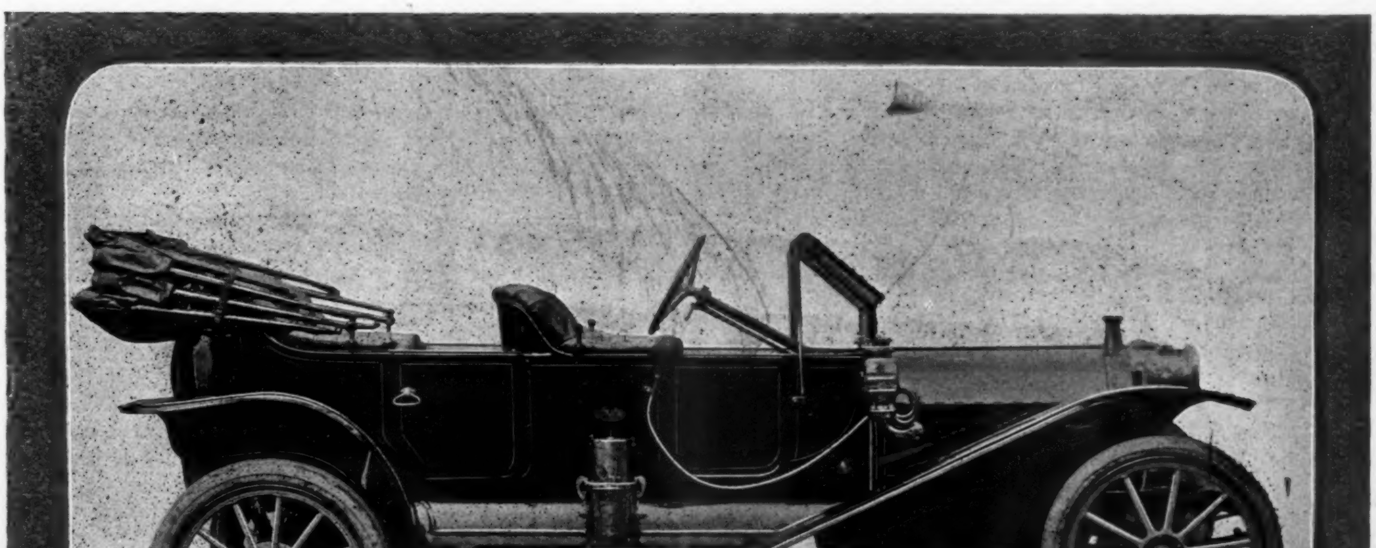


Fig. 1—Depicting the latest type of Hupmobile touring car with foredoors and a straight line design

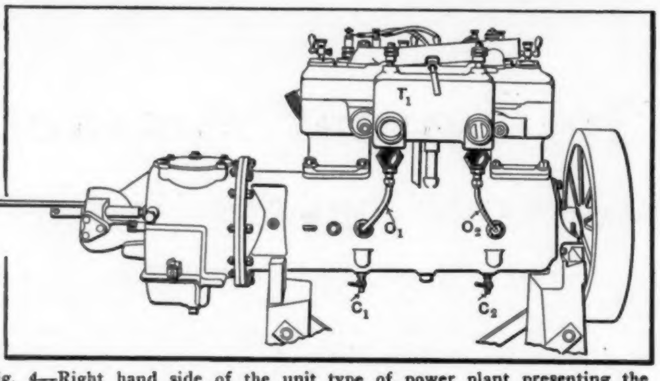


Fig. 4—Right hand side of the unit type of power plant presenting the oiling system and other details

unit type of power plant suspended between the chassis side bars, with a shaft drive to the live rear axle and a system of radius rods that is designed to maintain parallelism of the wheels in addition to taking the torquing moment as it is delivered by the motor to the torquing members of the live rear axle in the manner as shown.

Schedule of the Refinements that Have Been Made Bringing These Automobiles Up-to-Date

While it is not the purpose here to discuss the shop organization and the additions to equipment that are necessary in the turning out of a large number of cars along standard lines, attention is called to the equipment refinements and changes that experience has told the company it would be desirable to make. In the motor as shown in Figs. 4 and 5, adjustments have been fitted to the valve stems, they being in the form of caps with a locking means, thus affording to the operators of these cars a quick and accurate plan to be carried out when it is found necessary to retime the valves, as when the valves are reground, thus altering the distance between the seat thereof and the camshaft. The adjustment gives compensation, and an attempt has been made to render this adjustment means easy to manage, and permanent in operation. The lubrication system which is shown in Fig. 4, T1, is in the form of a reservoir located alongside of the cylinders, and the positive mechanism within the reservoir takes its drive by means of a vertical shaft, the latter being geared to the camshaft below. Oil is fed to the pipes O1 and O2, and tell-tales are fitted into the piping at a point near the reservoir. Moreover, the location of the same is such that the oil is maintained at a constant state of mobility, due to the passing of heat from the adjacent cylinder walls into the body of the lubricating oil, through the inside wall of the reservoir. For the purpose of cleaning out the crankcase, draincocks C1 and C2 are provided, and the oil level in the ordinary course is maintained at a constant height, but there is an added facility in the shape of a mechanism by means of which the rate of feeding of the oil is increased in proportion as the throttle is opened, so that the bearings get oil not only positively, but in proportion to their respective needs, it being the theory that the higher the speed, the greater is the necessity for lubricating oil, not on the assumption, however, that the film of oil between the journal and the box should be any thicker, but with the understanding that the heat generated, due to friction, will be absorbed in the profuse cooling oil bath, and the probability of overheating is annulled, first by the presence of an adequate oil film, and, second, by the cooling effect of the increasing flow of the lubricating oil.

The carbureter has been modified to allow of easier adjustment, affording a surer means of maintaining adjustments after they are made. Referring to Fig. 5, the carbureter C1 is located near the back arm on the left-hand side of the motor, and the intake manifold curves out and upward, connecting with the intake to the valves, in such a way as to give a considerable area of the surface of the intake manifold between the carbureter and the cylinders of the motor, it being the idea that the intake manifold is essentially a part of the carbureter, and it is the aim of the designer in this example to prevent the formation of

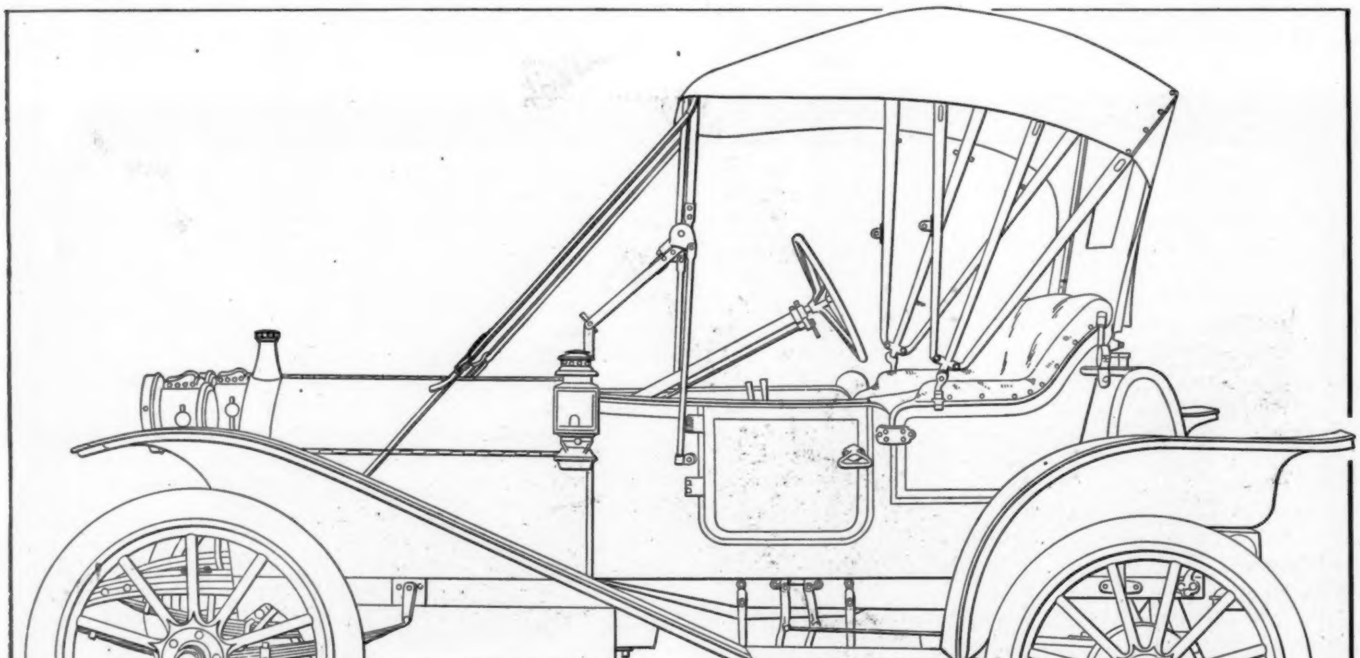


Fig. 2—Showing the foredoor type of runabout with the top up showing the gasoline tank back of the seat

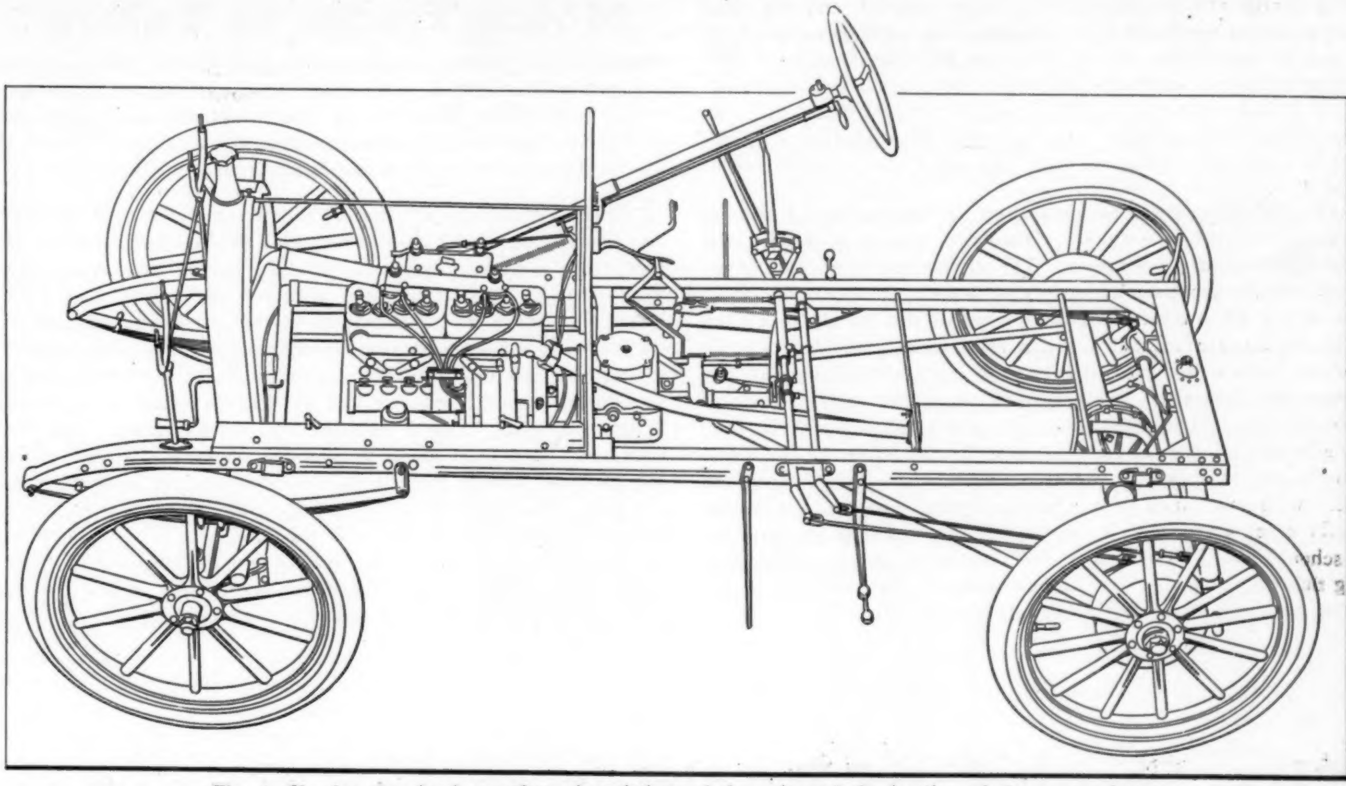


Fig. 3—Showing the chassis complete, the relations of the unit, and the location of the power plant

carbon in the cylinders of the motor by making sure that the quota of gasoline in the mixture will be completely volatilized before it gets to the combustion chamber, the theory being that gasoline, if it is permitted to go into the combustion chamber in a liquid form, will crack and carbon will be precipitated, in which form it will adhere to the walls, and remain there until it is scraped off mechanically. The magneto M1 is located back of the carbureter on the same side of the motor, and it sets on a shelf which is machined to afford alignment so that the drive, which is brought about by a shaft of the housing, will be without vibration or the other ill effects that might be traced to lack of alignment of the driving means. In the fashioning of the extension of the housing for the enclosing of the gearset that drives the magneto, care has been taken to supply the facilities for the quick removal of the cover, thereby making it possible to remove the magneto for the purpose of inspection or repair, and to put it back again as readily as it is removed, without requisitioning an undue measure of skill on the part of the repairman. The exhaust manifold M2 is fastened to the faces of the cylinders, the latter being cast in pairs, by means of four yokes. This manifold is straight and fair with a considerable area of the passageway, and it terminates in a threaded part to accommodate the fitting of the exhaust pipe, the connection for which comes in the plane of the rear edge of the back pair of cylinders.

The power plant of the self-contained type has its flywheel in front, and the transmission gear housing H1 is flanged to the rear of the crankcase, with the mechanism G1 located on the side for the manipulation of the sliding gear, giving two speeds and reverse. The clutch, of the multiple-disc type, is enclosed in the extension of the crankcase, and to facilitate the examination or removal of the clutch, the flange bolts holding the gearcase to the crankcase may be removed, thus permitting of the taking away of the gearcase, exposing the clutch to view, making it possible to remove the same if it is deemed expedient to do so. In the refining of the power plant, some attention has been given to the water piping, but the syphon system of cooling has been retained. The water intake passes from the bottom point by easy curves, sweeping up and over the flywheel, as the illustrations show, and in the latest undertaking the size of the outlet has been increased, thus affording a better flow of the water.

The clutch adjustment has been altered somewhat in the new model, and a device consisting of three screw plugs, with a means for positive locking after the adjustment is made, fixes the spring pressure. The differential bearings, which were formerly of the ball type, have been supplanted by roller bearings, and the pinions are now supported on either side of the differential system. In the revision of the brake the areas of the shoes have been increased, and the diameters of the drums are greater by two inches. Closures are provided for the purpose of preventing lubricating oil from running out of the axle tube and getting onto the braking surfaces. The spring seats of the front axle have been improved, affording a better means of clamping the springs, and the front wheels run on roller bearings. Among the revisions from the point of view of material and the quality used in these cars, mention is made of vanadium steel for the springs throughout, and in the fastening of the springs retainers of a somewhat better design are provided. Moreover, the tipping of the body, due to unequal loading, as when one passenger of avoirdupois sits alone in the seat, is prevented. Among the other incidental refinements, oil cups are used in the spring bolts and other necessary points. The run-

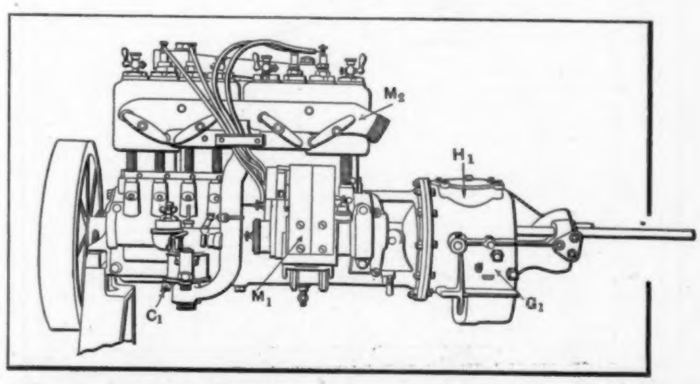


Fig. 5—Left hand side of the unit type of power plant showing the magneto installation, the location of the carbureter, and the position of the transmission gear

ning boards and mudguards have been widened, and the latter are provided with splash aprons, not only adding materially to the good appearance of the cars, but affording immunity from the splashing of mud as well.

Important Features Among the Remaining Considerations

The 16.9 horsepower motor as used in the smaller of the two chassis is of the four-cylinder type, with a bore of 3 1-4 inches and a stroke of 3 3-8 inches. The carbureter is of the Breeze type, and the auxiliary air supply is heated. The magneto is of the Bosch DU4 type. The gear ratio in this motor is 4 to 1. The brakes are located on the rear wheels of the car, the service brakes being of the internal expanding type and the emergency brakes are likewise constructed, the facings being of asbestos wire. The front axle is of the I-section, and the road wheels are of the artillery type with 10 spokes in the front wheels and 12 spokes in the rear wheels. The front wheels are fitted with 30 x 3 inch tires, which is true also of the rear wheels in the case of the 84-inch chassis, but the rear tires in the touring model are 3 1-2 inches in section. As a general proposition the scheme of design for both models is on a common basis, using the same size motor in each case.

Motor Traffic in Yukon

Equine relays and dog sledges to be replaced by closed passenger automobiles on the stage route between Dawson and White Horse. Tests have proven that blizzards cannot stop the motor stage, and residents are petitioning the Territorial Government to improve the roads.

THERE is a move on foot to test automobiles over the 320-mile route between Dawson and White Horse, which in wintertime is served by means of relay horses and sled stages. This route is very trying, the so-called highways being little better than mere trails. Residents of that section are endeavoring to bring influence to bear upon the Territorial Government to improve the roads to a passable condition for automobiles. The thermometer hovers around 50 degrees below zero in the Winter months. Closed vehicles are indispensable. But the tests that have been made with a 6-cylinder motor car which was put into service in 1910, have proven that the machine does not halt, even in the face of demoralizing blizzards. Sanguine people up in the Yukon Territory predict that it is but a question of time before an automobile service will be established there which will completely put the horse-drawn sled stages out of commission, both in carrying passengers and freight.

The Speed of Reciprocating Engines

Speed and the Factors Which Influence It

A consideration of the limitations of speed, with additional reference to horsepower formulæ as based upon the recent report of the Horsepower Formula Committee of the Royal Automobile Club and the conclusions arrived at by that body, this being the first instalment of an article by James Langmuir Napier. (Reprinted from The Automobile Engineer, London.)

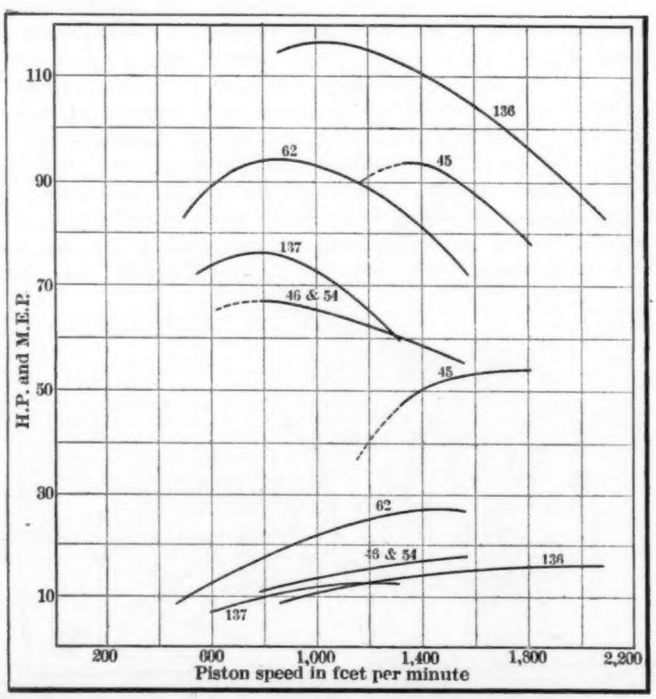


Fig. 1—Showing the relations of maximum horsepower and piston speed, considering engines of high stroke-bore ratio

IT is impossible in dealing with the subject of engine speed at this date to avoid consideration of the recently issued report of the Horsepower Formula Committee, and the conclusions as to engine speed arrived at by the committee. These conclusions include a general statement that piston speed varies with the ratio of stroke to bore, and a particular determination that the variation can be expressed by the equation $\sigma = 600\ (r + 1)$, σ being piston speed in feet per minute and r the ratio of stroke to bore.

In order to ascertain what support for these conclusions was to be found in the table of engine data on which the report is based, I extracted from the table all results derived from two classes of engines, the first including those having a stroke-bore ratio of 1.08 or under, and the second those having a stroke-bore ratio of 1.5 or more. These numbered twenty-four and twelve engines respectively, and yielded certain numerical averages which I set down here for what they are worth, with the warning that the great majority of the trials were incomplete, and that averages should be used with caution in any case.

Stroke-bore Ratio.	σ at Max. H.P.	σ at Max. ηp.	Max. ηp.	ηp at Max. H.P.
1.005	1264	675	88.8	70.57
1.59	1512	828	82.0	66.81

As in the committee's report, ηp means effective mean pressure, including the mechanical efficiency of the engine. It will be noted that the average speed at maximum horsepower supports the general conclusion of the committee. The tendency of the other averages may be obscure at this stage.

From these twenty-four and twelve examples I have selected those in which the trials were sufficiently extended to reach, or nearly reach, both the speed at maximum horsepower and the speed at maximum ηp, and in which the results were not vitiated by obvious errors of observation. I have plotted the results of these trials in Figs. 1 and 2, of which Fig. 1 represents the results of the engines of high stroke-bore ratio, and Fig. 2 those of low stroke-bore ratio. I have taken a liberty with the result of Trial No. 45 by altering 63.9 horsepower, which may be a mis-

print, to 53.9 horsepower, which is in accordance with the general trend of the curves. In both figures the upper series of curves represent the mean effective pressures and the lower the horsepowers. Even where these cross there should be no difficulty in distinguishing between them. For ease of reference I append here a table of the principal dimensions of the engines of which the trial results are plotted in the figures:

Fig.	No.	Bore.	Stroke.	Ratio.	No. Cyl.
1	45	4.00	7.00	1.75	4
1	46 and 54	2.95	4.73	1.60	4
1	62	3.15	4.73	1.50	4
1	136	3.94	6.30	1.60	4
1	137	2.60	3.94	1.52	4
2	4	4.73	5.00	1.06	4
2	14	4.73	5.00	1.06	6
2	78	4.63	5.00	1.08	4
2	79	5.00	5.13	1.03	4
2	100	4.50	4.50	1.00	6
2	110	4.73	5.12	1.08	4
2	131	4.50	4.75	1.06	6

It is not necessary to examine in detail the curves plotted in Figs. 1 and 2. A glance is sufficient to indicate that the simplicity of the relation $\sigma = 600\ (r+1)$ must be considerably modified to account for the variations exhibited in each figure and as between the two. There are, in fact, only two points of consistency observable, and both relate, not to speed at maximum horsepower, but to speed at maximum ηp. It will be observed that between the two diagrams there is no overlapping. The speed at maximum ηp is always higher in Fig. 1 than in Fig. 2, and taking Fig. 1 by itself, the speed at maximum ηp is always higher when the stroke is greater.

The "maximum practicable piston speed" is not defined, but since it is said to be $600\ (r+1)$ feet per minute, and that quantity is used in calculating the maximum brake horsepower rating, it seems reasonable to assume that "maximum practicable piston speed" is intended to be taken as piston speed at maximum horsepower, and this speed is said to be the same for an engine with cylinders 2 1-2 inches x 2 1-2 inches as for an engine with cylinders 5 inches x 5 inches, with the somewhat paradoxical result that doubling the stroke has no effect on the relative power of the two engines.

The explanation is, of course, that the increased piston diameter has a detrimental effect (other than the heat effect which is separately accounted for) precisely equal to the benefit derived from the increased stroke. From Mr. Burls' explanatory paper it appears that this detrimental effect arises from the increased mass of reciprocating parts corresponding to increased cylinder diameter.

As I shall show later, the influence of reciprocating mass on speed in any reasonably designed engine is practically negligible. It is true that under certain circumstances heavy reciprocating masses may make high speeds unpleasant, but they do not make high speeds impossible, or even (within the limits of the strength of materials) appreciably more difficult of attainment. If any limitation of this nature be admitted, the committee's formula becomes, not a measure of possible horsepower, but a measure of pleasant horsepower. Mr. Burls is logical in this matter, and has endeavored to set up a standard of pleasantness, but his standard is too low. It is infringed by every four-cylinder engine.

My view of the matter is that in attempting to determine the variation of piston speed with stroke-bore ratio, the committee has begun at the wrong end. I propose to begin by considering ηp, which is, after all, the source of piston speed, and probably more effective than a mathematical abstraction.

A cylinder may be supposed to be filled with gas of a definite heating value at the pressure of the atmosphere, and that gas may be supposed to be exploded and expanded behind a piston moving with infinite velocity, so that no external cooling of the gas takes place. Under such circumstances the mean pressure in the cylinder during the working stroke would have a maximum value which I shall call A.

If, however, the gas be required to follow the piston into the cylinder in a short period of time the pressure in the cylinder must be less than the atmospheric pressure. The total heat in the charge of gas, and approximately also the mean pressure, will be diminished in the proportion $\frac{p}{P}$, corresponding to the pressures inside and outside the cylinder, and if the stroke were sufficiently long the mean pressure during the working stroke would be approximately $A\frac{p}{P}$. Supposing the inlet valve to be equal in area to the piston, and the piston to move with a constant velocity v, then the equation connecting v and p is

$$v^2 = C^2\left(1 - \frac{p}{P}\right)$$

where C is the velocity with which gas would flow into a vacuum under atmospheric pressure.

This equation assumes the gas to have acquired velocity by falling through a height, and to be flowing with a constant velocity. We have to consider, however, that the gas is at rest at the beginning of the stroke and acquires the velocity of the piston under the influence of gravity and its own elasticity while moving through the distance s, the length of the stroke. Under these circumstances we should have

$$v^2 = Bs\left(1 - \frac{p}{P}\right)$$

B being a constant. From this we get $\frac{p}{P} = 1 - \frac{v^2}{Bs}$ and

$$A\frac{p}{P} = A\left(1 - \frac{v^2}{Bs}\right)$$

which would be the mean pressure if there were no cooling and if the motion of the piston were uniform. Neglecting true piston motion exaggerates the effect of long stroke.

The diameter of the cylinder will certainly influence the rate of cooling of the exploded charge. I have not had the advantage of reading Professor Callendar's paper on the subject, and I have made no independent investigation of it. It seems reasonable, however, to suppose that the rate of cooling will be, more or less, directly proportional to the cooling surface and inversely proportional to the volume cooled.

Taking only the water-cooled surface of the cylinder, the rate of cooling would thus be proportional to

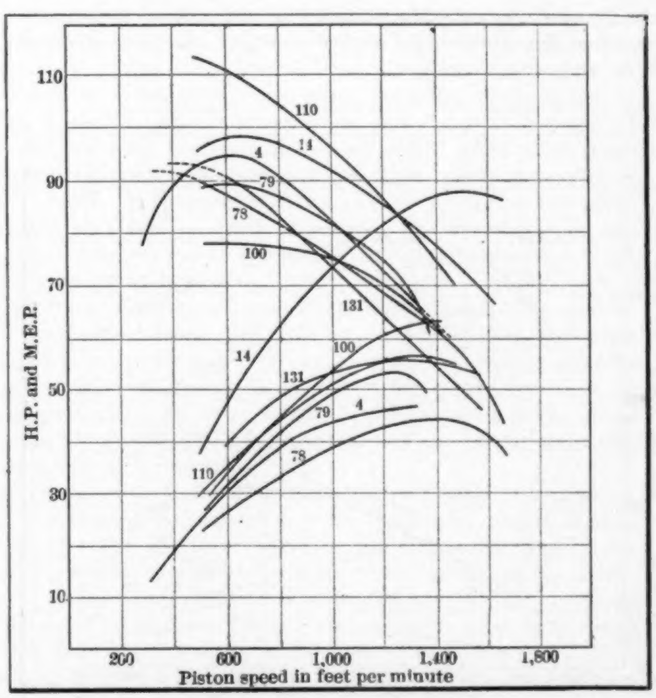


Fig. 2.—Illustrating relations of maximum horsepower and piston speed in regard to engines of low stroke-bore ratio

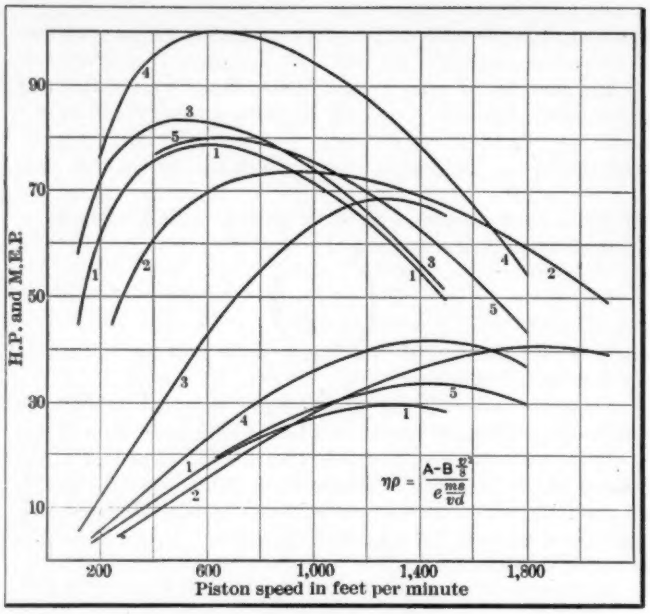


Fig. 3—Showing curves depicting relations of mean effective pressure, piston speed and maximum horsepower output

$$\frac{\pi d s + \frac{\pi}{4} d^2}{\frac{\pi}{4} d^2 s} = \frac{4}{d} + \frac{1}{s} = 4\left(\frac{1}{d} + \frac{1}{4s}\right)$$

The rate of cooling is also directly proportional to the difference of temperature, so that we have, if T be temperature of gas, t time, and C temperature of cooling water,

$$\frac{dT}{dt} = -m\left(\frac{1}{d} + \frac{1}{4s}\right)(T - C)$$

$$\text{and } T = Re^{-mt}\left(\frac{1}{d} + \frac{1}{4s}\right) + C$$

$T = R + C$, which is the temperature corresponding to the ideal mean pressure A, and since pressure is proportional to temperature, when the stroke is performed in time t, the mean pressure will be proportional to

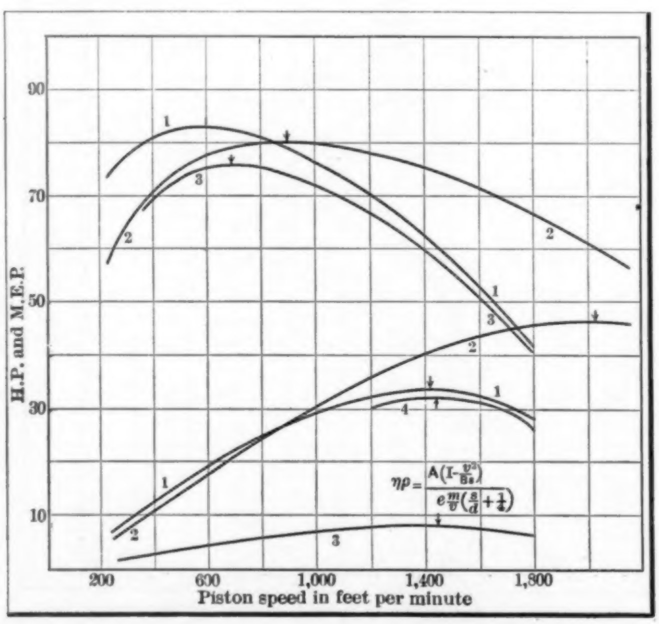


Fig. 4—Illustrating the relation of corresponding functions, applying a different constant for the purpose

$$A . \frac{Re^{-mt}\left(\frac{1}{d} + \frac{1}{4s}\right) + C}{R + C}$$

And if we assume (introducing a further error) that C is the temperature of the bottom line of an indicator diagram, this expression becomes

$$A . e^{-mt}\left(\frac{1}{d} + \frac{1}{4s}\right)$$

which, since t is equal to $\frac{s}{v}$, may be written

$$\frac{A}{e^{\frac{m}{v}}\left(\frac{s}{d} + \frac{1}{4}\right)}$$

Combining this with the previously assumed effect on mean pressure of increased stroke, we arrive at the equation:

$$\eta p = \frac{A\left(1 - \frac{v^2}{Bs}\right)}{e^{\frac{m}{v}}\left(\frac{s}{d} + \frac{1}{4}\right)}$$

which is the equation used in plotting the curves of mean effective pressure and horsepower shown in Fig. 4.

The curves plotted in Fig. 3 are deduced from the probably less accurate approximation:

$$\eta p = \frac{A - \frac{Bv^2}{s}}{e^{\frac{ms}{vd}}}$$

in which, of course, the constants, although indicated by the same letters, have different values. The method by which these curves are arrived at is as follows:

If u and y are functions of x, $\frac{u}{y}$ is a maximum when $\frac{u}{y} = \frac{\frac{du}{dx}}{\frac{dy}{dx}}$, therefore, ηp is a maximum when

$$\frac{A - \frac{Bv^2}{s}}{e^{\frac{ms}{vd}}} = \frac{-\frac{2Bv}{s}}{\left(-\frac{ms}{v^2 d}\right) e^{\frac{ms}{vd}}}$$

$$A - \frac{Bv^2}{s} = \frac{\frac{2Bv}{s}}{\frac{ms}{v^2 d}}$$

$$As - Bv^2 = \frac{2Bv^3 d}{ms}$$

$$\therefore \eta p \text{ is a maximum when } m = \frac{2Bv^3 d}{As^2 - Bv^2 s}$$

From the experimental results plotted in Fig. 2 it appears that when s is equal to d, ηp is a maximum at about 600 feet per minute, or 10 feet per second, and by trial it is found that 1-40 is a probable value of B. Taking A in the first instance at 100 and s and d each equal to 1-3 foot

$$m = \frac{\frac{1}{20} \times 1000 \times \frac{1}{3}}{\frac{100}{9} - \frac{100}{120}} = \frac{\frac{1000}{60}}{\frac{3700}{360}} = \frac{60}{37} = 1.62162$$

And this value of m is used throughout in plotting the curves shown in Fig. 3.

The constants A, B and m are affected by alteration of conditions. A depends, among other things, on the quality of the explosive mixture, compression and ignition; B on such considerations as area of inlet and exhaust valves and passages and on valve timing; m depends principally on the temperature of the cooling water. All such conditions are assumed to be constant unless otherwise stated.

In Fig. 3 the curves of mean effective pressure and horsepower numbered 1 are supposed to be those of an engine having four cylinders, 4-inch bore by 4-inch stroke. A is taken as 100 and B as 1-40. In the curves numbered 2 the conditions are altered by doubling the stroke; in those numbered 3, by increasing the stroke to 6 inches; in those numbered 4, by increasing A to 125; and in those numbered 5, by reducing B to 1-50. In each case the curves Nos. 2, 3, 4 and 5 represent curve No. 1 with one condition altered.

From curves No. 2 it will be seen that, on the assumed equation, the effect of increase of stroke is to increase the maximum horsepower, to increase the speed at which the maximum horsepower is exerted, and to increase the speed at which the maximum ηp is reached. Also the maximum ηp and ηp at maximum horsepower are diminished.

Curves No. 3 exhibit the increased ηp due to increase of cylinder diameter, and the decreased speed at which the maximum ηp is reached, due to diminished stroke-bore ratio. It is not quite clear on the diagram (Fig. 4 shows it better), but the speed at which the maximum horsepower is reached is slightly less in curves No. 3 than in No. 1.

Curves No. 4 show the effect of increasing A. The horsepower is, of course, increased, as also are the speeds at maximum horsepower and at maximum ηp.

The reduction of B, as shown by curves No. 5, has, as might be expected, an effect somewhat similar to that of the increase of A.

In Fig. 4, curves No. 1, we have the same original engine as in curves No. 1, Fig. 3. Curves No. 2 and No. 3 show the effect of an increased stroke-bore ratio in both cases. In curves No. 2 the increased ratio is arrived at by doubling the stroke, and in curves No. 3 by halving the diameter. Curves No. 4 are part of curves No. 3 increased with regard to curve No. 1 inversely as the squares of the cylinder diameters. The difference between curves of horsepower Nos. 1 and 3 is, therefore, the difference due to more rapid cooling of the smaller cylinder. In Fig. 4 I have marked with arrows the calculated maximum points.

It is hardly to be expected that the admittedly erroneous formulæ which I have used in plotting the curves in Figs. 3 and 4 can give accurate numerical results. They can only represent tendencies. It is apparent, however, that the curves of Figs. 3 and 4 could be mixed with those of Figs. 1 and 2 without any certainty that, if the numbers were obliterated, the difference between the natural and the artificial could be detected. Applying the method of averages, dividing the curves of Figs. 3 and 4 into those which have a stroke-bore ratio of unity or less and those which have a stroke-bore ratio greater than unity, we get the following comparison:

Stroke-bore Ratio.	σ at Max. H.P.	σ at Max. ηp.	Max. ηp.	ηp at Max. H.P.
0.93	1375	604	84.8	64.1
2.00	1760	850	76.3	57.16

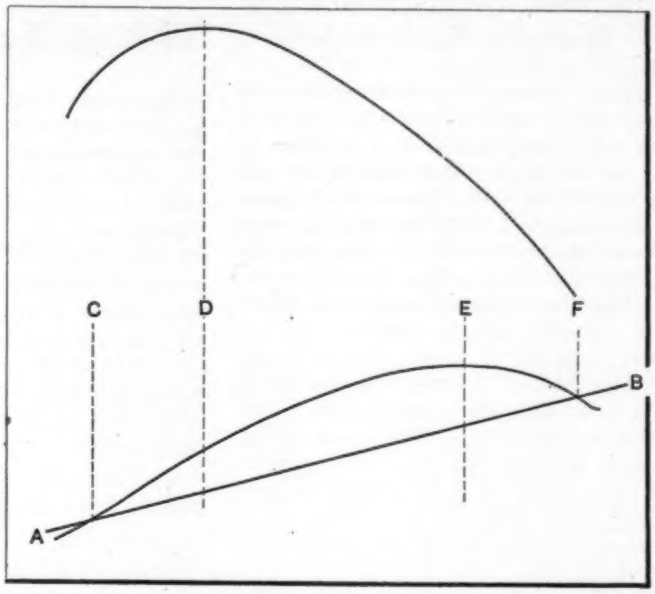


Fig. 5—Curves illustrating the relation of resistance horsepower and flexibility in automobile engines

This is fairly comparable with the averages obtained from the thirty-six engines from which the results shown in Figs. 1 and 2 are selected.

It would be futile without much fuller information to attempt to account for all the diverse results tabulated in Figs. 1 and 2. It becomes possible, however, by means of a single example to illustrate the apparent divergence from type that may exist when engines are classified solely by stroke-bore ratio. Engine No. 137, Fig. 1, has a fairly high stroke-bore ratio, but when it is measured by its concrete dimensions it is a small-bore engine with a short stroke, and it embodies most completely all the appropriate vices. The mean effective pressure is low, owing to the small bore; the speed at maximum horsepower is low, owing to short stroke; and the speed at maximum ηp is high, owing to the high stroke-bore ratio accentuated by the small bore. Such an engine is peculiarly inflexible, and, as a matter of fact, its record puts its useful limit of piston speed between 800 and 1,200 feet per minute.

Unlike the reciprocating steam engine, which is not designedly subject to external cooling, the internal combustion engine has two critical speeds. The first of these is reached at the point of maximum ηp, at which point, or at any lower speed, the engine is, so to speak, in unstable equilibrium, and the least increase of load will show the engine. The second critical speed is the speed at maximum horsepower, and between these speeds the engine is truly flexible. It is important for motor car work that this range of speed should be as great as possible, and in this respect the long-stroke engine has an advantage. A fictitious flexibility may, however, exist at both ends of the speed scale. In Fig. 5, A B represents an imaginary curve of resistance horsepower, that is, load multiplied by velocity. The engine horsepower and mean effective pressure are shown by curves similar to those in previous figures. Although the maximum ηp of the engine occurs at D, the engine will still possess relative flexibility down to the speed corresponding to C. The flexibility at this end of the scale may be described as accidental.

At the other end of the scale the added flexibility between E and F is gained by employing a more powerful engine than is necessary. The engine cannot exert its full power, and at any speed between C and F must run throttled. If the engine is subject to rating disabilities and it is desired to take full advantage of the rated horsepower, the gearing must be of such proportions as will make the line A B cut the horsepower curve at E. It is this consideration which fixes the diameter of locomotive driving wheels, and which accounts for a good many differences commonly attributed to the efficiency or want of efficiency of marine propellers.

What Some Subscribers Want to Know

Subscriber Invents a New and Desirable Wind Shield

Editor THE AUTOMOBILE:

[2,694]—I enclose herewith two views of a new idea in wind shields (Figs. 1 and 4). The model shown has been in operation on my car for about two months and works perfectly. It is easily lowered and raised, and when up is a good dust shield as well as wind shield, the dust shooting over the head of the driver. The cloth is waterproof and is a very efficacious rain shield. Side curtains can be attached to the shield, making a very effective rainy weather device. I intend having them made prior to a trip North in July. The device is carried by a filler board on top of dash, with but one other connection to the body, the pivot at lower ends of side rods. These rods can be curved to a greater or lesser extent to fit different models of cars.

The shield is held up by friction in the bearings at sides of filler boards, which carry the two small supporting rods.

G. L. SMITH.

Washington, D. C.

Overheating Obtains with a Retarded Spark

Editor THE AUTOMOBILE:

[2,695]—Being a subscriber to your journal, I would ask which is the proper way to run an automobile, the spark in advance of the gas, or the gas in advance of the spark, and under which condition will the motor overheat the quickest?

DR. JAMES L. PERRY.

Plainfield, N. J.

The question as put is not quite plain, but we gather from an examination of the same that the point to be made is in relation to the effect of a retarded versus an advance spark. The timing of the spark should be regulated in proportion to the speed of the motor. When the motor is going fast, the spark should be advanced accordingly, and as the motor slows down, to retard the spark in proportion is the right idea. If, however, the spark is retarded too much, considering the speed of the motor, a condition of overheating will creep in, due to the fact that the gas will not burn before the piston starts on its power stroke, with the result that the highly heated products of combustion will linger in the motor for a greater length of time, and the excesses of heat will be imparted to the cylinder walls over a greater area instead of being confined to the combustion chamber surfaces, which would be true at the time of maximum heat were the mixture to burn while the piston is on the compression stroke dwell point, completing the burning operation before the beginning of the power stroke. This desired condition is approximately realized when the ignition takes place at the right point, considering speed.

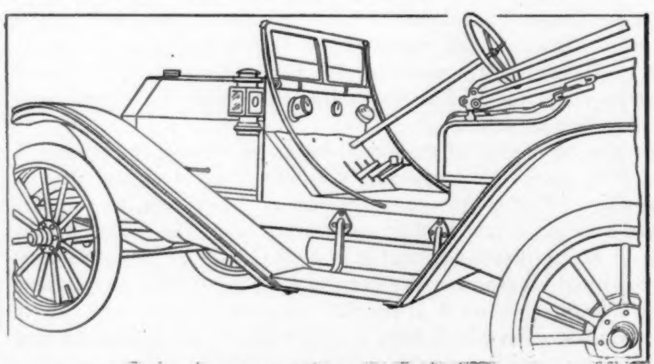


Fig. 1—Looking at the windshield folded back showing entire freedom from obstruction and a neat arrangement of the folded fabric

Brief for Extreme Simplicity

Editor THE AUTOMOBILE:

[2,696]—Your remarks on lubrication by mixing oil and fuel begin nicely by stating that controversy is frequently due to the point of view. This must be granted. But it does not seem that there should be any controversy about the value of simplicity. Of two methods which give equal results, the simpler should always be chosen. The aim of every mechanic is to find the device which can accomplish its results with the least number of parts.

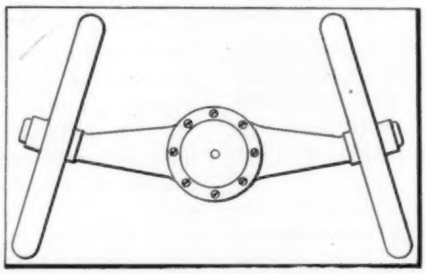


Fig. 2—Depicting a sagging rear axle showing a poor set of conditions that should not obtain

A further aim is to find that device which, while simpler, is also better. Some one has said that all great things are simple. It is largely true. The crude, unfinished, imperfect device for any given purpose is always marked by complexity. Does it not seem reasonable, therefore, to accept the oil-fuel mixture as better and more modern than the complicated oiler with its pipes and pumps? And when we remember that the oil-fuel mixture feeds the engine parts proportionately to the power and heat developed, whereas the usual pump feeds according to speed regardless of power required or fuel burned, it will be seen that the oil-fuel mixture far surpasses the oiling machinery in capability just as it does in simplicity.

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their automobile troubles, stating them briefly, on one side of the paper only, giving as clear a diagnosis as possible in each case, and a sketch, even though it may be rough, for the purpose of aiding the Editor to understand the nature of the difficulty. Each letter will be answered in these columns in the order of its receipt. The name and address of the subscriber must be given, as evidence of good faith.

That certain oils and certain engines cannot be used with this system is no argument against it. We do not condemn the steam turbine because it seems not adapted to small powers like the automobile needs. You are quite right that castor oil would fail flatly if one attempted to dissolve it in the fuel. Castor oil is one of the few oils that will not readily dissolve in gasoline. Its price puts it where most autoists are not hunting for it for daily use in their engines, and few road users are caring owing to the fact that their engines do not run at 2,000 feet piston speed anyhow. That other oils contain paraffin wax, which does not dissolve easily, is a defect of the oil rather than a defect of the system. The car owner expects to buy the fuel suited to his engine and can just as easily buy the oil suited to his engine. The needs for analysis are no greater in one than in the case of the other. The oil once dissolved in the fuel is certain to reach the proper spots, and once there will do its duty just as fully if carried by the fuel as if fed through a separate oiler. If it is of poor quality it needs to be fed more plentifully in either case. If of poor quality it may interfere with the mixture in either case, but the chances of such interference are greater with the mixture feed and the chances of causing an investigation are greater than with the mechanical feed.

On the point of certainty the mixture feed has the advantage. There are no parts to need attention, to clog or go wrong. A stoppage of the oil supply is also a stoppage of the fuel supply and the engine at once stops. There are no empty oilers to make trouble. Many a bearing has been ruined because the oilers were not filled or the pump did not work, or the pipes clogged. With the oil mixture this is impossible. The oil and fuel are mixed before being placed in the tank. If the oil is wax instead of grease and will not mix, the fact is noticed at once. Surely this makes for safety. Once mixed a high-grade mineral oil will not separate, and so

What Other Subscribers Have to Say

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their personal experiences for publication in these columns for the worthy purpose of aiding brother automobilists who may be in need of just the information that this process will afford. Communications should be brief, on one side of the paper only, and clearly put, including a rough sketch when it is possible to do so, and the name and address of the writer should be given as evidence of good faith.

the autoist can rest perfectly easy knowing that his engine is oiled just as it should be. It is quite evident that you have not used both methods or you would not for a moment suppose that any such certainty and perfection could be had by a mechanical method. Almost any automobile maker can tell you of oil pumps put on wrong, or of leaky pipes, of stuck pump valves, or any one of a dozen other things which are liable to stop an oiling system in spite of the fact that they are much simpler to-day than ever before. Let us hope that in time they will arrive at the point of extinction so far as the inner engine parts are concerned.

It is unfair to the reader to stop without calling attention to the fact that only certain engines are adapted to this method of lubrication, for if the mixture does not reach the engine parts it cannot lubricate them. The method is therefore adapted mostly to 2-cycle engines and to such 4-cycle engines as take their mixture into the crank case before passing it to the cylinder. It is used to a limited extent to assist in cylinder oiling in engines of the usual 4-cycle type and adds sweetness to their running, as the owner of any hot high-speed engine can easily determine by trial. CHAS. E. DURYEA.

Motor Went Awry in the Repairing Operation.

Editor THE AUTOMOBILE:

[2,697]—I have a Packard car which has just been overhauled on account of heating motor. The change has not remedied it any. The motor keeps cool in low speeds, motor running fast, and when the car is driven fast in high gear, but when the car is driven at 15 miles per hour, the motor heats up and water boils. What is the trouble?

A SUBSCRIBER.

Brooklyn, N. Y.

Your difficulty may be traced to: (a) feeding too much gasoline; (b) running on a retarded spark; (c) valves not properly timed, or (d) ignition system not delivering a sufficient spark to properly inflame the mixture.

As Axles Sometimes Are and as They Should Be Made

Editor THE AUTOMOBILE:

[2,698]—When I purchased my automobile I thought that I was careful enough to avoid selecting a car that would have a sagging axle, but in less than a month after I put the car in service the axle began to sag. I do not understand why this should be so, and the question is, what am I to do to avoid the trouble, or, better yet, how can I fix the axle so that it will not look as if it is going to fail? ANXIOUS.

New York City.

Slightly exaggerated, the design shown in Fig. 2 shows how the axle looks, due to the sag complained of. Fig. 3 presents the same illustration, with the exception that it is reversed in printing. Fig. 2 shows a very bad condition that should not obtain in axle work. Fig. 3 shows more nearly how the axle should be made. It is not possible to approximate the condition as shown in Fig. 3 in actual practice, except by making preparation and designing the axle in a way that is far more complicated than is ordinarily true of live rear axles. Were the axle so designed that it would look something like Fig. 3, it would than be possible to say for it that any little sagging that might transpire would scarcely be noticed in the ordinary course of events, and the second advantage would lie in the fact that the road wheels would roll on plumb spokes. In the absence of preparation of the character indicated, considering live rear axles as they are usually made, it is necessary to remove all lost motion from the bearings and to make sure that the tube is not bent. The jackstays should be kept well tightened up. It is no impropriety to tighten up on the stays so that the tube will be a slight bow in the upward direction. If too much bow is given, it is true that the differential gears will be cramped. This cramping of the gears will not be so damaging if they are of the bevel kind. Care should be taken not to bow the axle up too much.

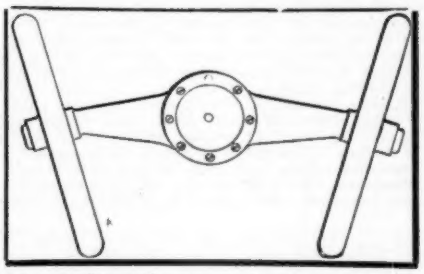


Fig. 3—Presenting the axle shown in Fig. 2, excepting that it is printed reversed, indicating more nearly how it should look on the road

Bad Castings or Defective Manipulation

Editor THE AUTOMOBILE:

[2,699]—I would like to have someone explain what may cause a cylinder to leave its base, not exactly blow up, but break off near the base; the cylinder and piston had plenty of oil. A SUBSCRIBER.

Fall River, Mass.

It is not impossible to consider a defect in the cast iron of which the cylinders are made. Another way to break a cylinder is to speed the motor up and then retard the spark too much. A combination of bad castings and faulty operation would contribute largely to the result realized.

The Adiabatic Curve Disturbs an Automobilist

Editor THE AUTOMOBILE:

[2,700]—Despite the apparent simplicity of an automobile motor, it has some marvelous things within its makeup, one of which is the adiabatic curve of song and story. Will you tell me what it is?

Brooklyn, N. Y. J. D. F.

Glad to accommodate you. Looking in Webster's Dictionary the adiabatic curve is thus described: "Not giving out or receiving heat." In further explanation the dictionary goes on to say: "Adiabatic line or curve; a curve exhibiting the variations of pressure and volume of a fluid when it expands without either receiving or giving out heat."—*Rankine.*

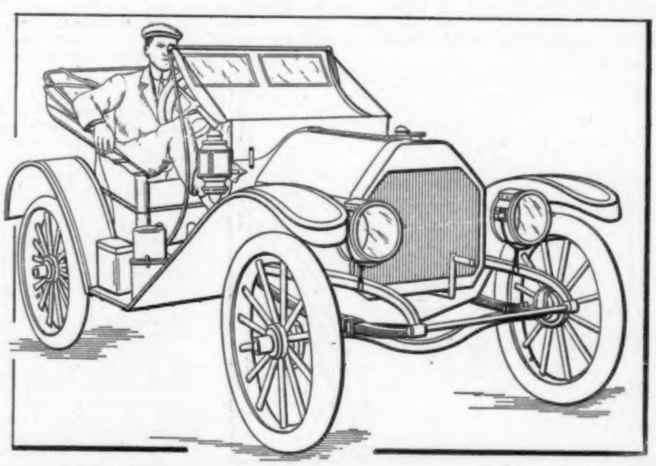


Fig. 4—Looking at the wind shield from the front, showing the rigid support and how the natural shape of the shield serves to deflect the air currents above the heads of the occupants of the seat

Meeting Recurring Troubles

Presenting a Series of the Most Probable Cases

A series of correlated short stories, accompanied by diagrams and characteristic illustrations, including the nature of the troubles that are most likely to happen to automobiles, discussing their causes and effects, all for the purpose of arriving at a remedy. It is the aim, for the most part, to show how these troubles may be permanently remedied, and as a secondary enterprise it is indicated how the automobilist can make a temporary repair, thereby enabling him to defer the making of a permanent repair until a convenient time arrives.

Cement to Use Depends Upon Composition of Rubber in the Case—Since raw rubber compounds are ill-suited to serve in any place that requires strength under heat-changing conditions,

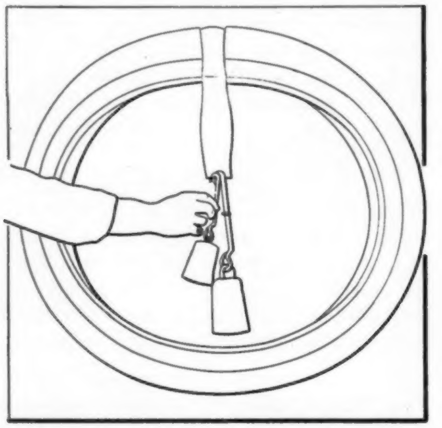


Fig. 1—Testing the strength of the gum in a rubber tire by sectioning out a strip and hanging weights thereon

it is the practice commercially to mix with the rubber some material that will serve as a vulcanizing medium in order that heat, when it is applied at the right temperature, will so alter the characteristics of the rubber that they will afford strength under heat-changing conditions and permit of using the rubber in the manner as illustrated in the making and using of tires. If the rubber compound that is used in the making of tires is suited to the work, it will then be found that there is a considerable amount of strength induced in the rubber, and that the effect of heat is not marked. It will also be found that when two pieces of fabric are cemented together with the rubber compound and they are then subjected to a vulcanizing process, they will adhere to each other, showing the same strength as if the rubber was of one piece, without any joint at all. To give an idea of just what is intended, reference may be had to Fig. 1, showing a tire with the fabric cut, taking out a ribbon about one inch wide and of a thickness of one layer of the same. This layer, as it is cut out, leaves one end still adhering to the case, and if a weight is applied to the free end of the ribbon in the manner as shown, it will be found that a certain amount of weight can be sustained by the rubber that joins the free ribbon to the case, but that the weight sustained will be more or less depending upon the quality of the gum and the care with which the vulcanizing process has been conducted. In making a repair, if the cement is not of good quality it will be found that the weight required to sever the patch from the surface to which it is applied will be comparatively little, and the point that is to be made here is that the character of the cement that is to be used in making a repair should be in accord with the composition of the gum that is used in the making of the case. The best way, under the circumstances, is to get the gum that is to be used in the making of the cement for repair work from the maker of the tire, or purchase cement from the same maker, so that there will be no question of the efficacy of the material so used.

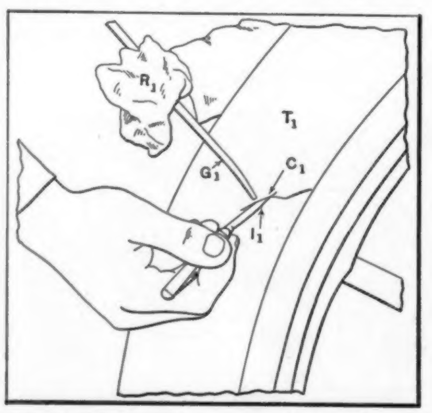


Fig. 2—Showing the method of cleaning a cut in a tire after examination shows that the wound is not a deep one

The Part That Rubber Plays in Tires—Rubber may be so altered in its chemical composition, or better yet, characteristics, that, when it is diluted with sulphur or other suitable substances, it will not only harden under high temperatures, but it will thereafter remain so. If it is desired to keep the rubber from hardening too much, all that has to be done is to use less of the sulphur, or other vulcanizing substances, and regulate the vulcanizing heat to that which is known to produce the desired result.

Rubber is used in tire making for the purpose of sticking the layers of fabric, one to the other and all together. It is also employed to seal up the cotton, of which the fabric is composed, in order that mildew and other rotting agents may be locked out. In addition to the performance of these functions, the rubber is employed in a compound to make a toughened tread for the tire, so that when it rolls over the rough ground, contacting with sharp stones and other impediments, the fabric will be protected, it being the case that the toughened tread of rubber compound is better for this purpose than any other material that is now sanctioned for use, excepting, of course, that there are special forms of treads that do good work, and they are frequently used in conjunction with rubber for the accomplishment of this end, notably leather treads.

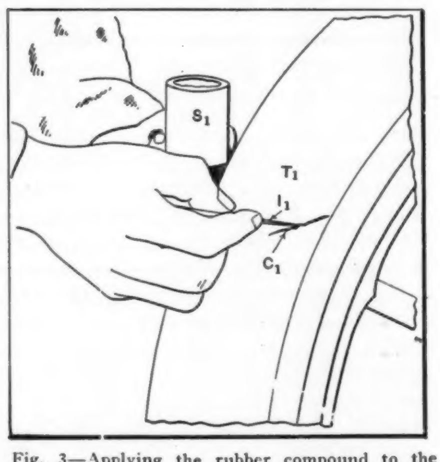


Fig. 3—Applying the rubber compound to the cut after the wound has been thoroughly cleaned out

At all events, the rubber does several things, none of which is of the character that popular belief seems to accord to it. True, rubber is a resilient material, and that a rubber ball will bounce is too well known to be denied. The fact remains that it is the air in the pneumatic tire that is given the privilege of doing the bouncing part, and it is understood by those who have studied the matter that air, under pressure, is far better than rubber for all such purposes, as cushioning the blow.

Leaving it to air, then, to do the work of dampening the blow and serving as springs for the automobile, it remains to emphasize the part that rubber plays in tires, and right here it will be well to mention the fact that this strange material, in addition to being waterproof, is airtight; inner tubes will hold air under pressure because the walls are of such fine texture that air, even under pressure, leaks through very slowly indeed.

Rubber is Secondary from the Strength Point of View—The strength of the tire resides in the cotton fabric; this strength will prevail as long as the fabric is protected from its enemies, they being mildew, rust, acid, grease, dirt and mechanical efforts as flexure, centrifugal strains, excessive loading and abrasion or cutting.

Anything that will keep mildew away from the fabric will also bar out everything else that will not serve as a solvent for the rubber compound. Unfortunately, some of the substances that come into contact with the rubber will dissolve it; among these solvents grease is the material that is most likely to be encountered.

Rubber, as long as it is kept in perfect condition, wards off all honest natural enemies, as mildew, dirt, etc., and if the rubber can be kept in perfect condition, the tires will last for a long time. Automobilists fail to heal up the little blemishes on the surfaces of the outer casings before they begin to fester; they wait until the cotton fabric, which, as a wick, pulls in water, and with it a horde of mildew, is all eaten away, sometimes for a foot or more away from the surface blemish that is responsible for the damage.

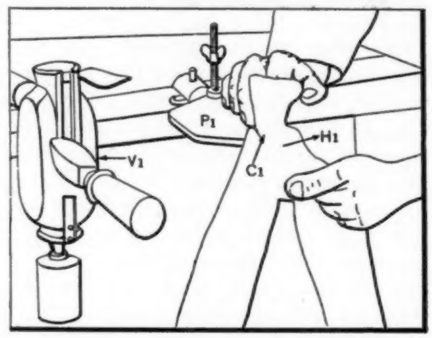


Fig. 4—In repairing a cut to an inner tube cleanliness must also be observed if success is to be assured

Just how large an opening will have to be to allow the cotton fabric to "wick in" water and mildew, that is ever in solution, is a matter which autoists differ about, but it is a moral certainty that the water and the mildew are content with a very minute opportunity.

Cleaning is an Important Part of the Process—In the repair of little wounds—remembering that they are more dangerous than big cuts because they may be left unattended to for a month or more, whereas big cuts will compel immediate attention—assuming that the tire is cleaned with tepid water and castile soap to begin with, it remains to swab out the wounds and open them up a little, if necessary, preparatory to the application of the desired amount of the proper grade of cement to be used for this purpose.

The best cement to employ is not to be arrived at by just going to the nearest garage and buying a tube of rubber cement. Each make of tires on the market has some proportion of rubber compound that differs from the other, and the right cement to use is that which will stick to the particular compound of which the rubber or the tires is composed.

Having procured the proper grade of cement for this purpose and having applied it to the cleaned and enlarged wound, it still remains to vulcanize the patch, if such it might be called, ere the new rubber will adhere and remain permanently attached to the old.

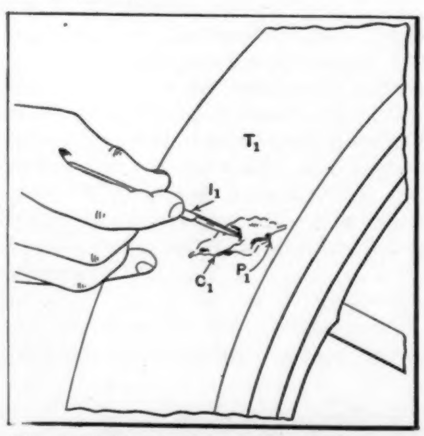


Fig. 5—Stuffing Para gum into a cut in a casing, first cutting the gum into thin strips

The Process of Vulcanizing Tires—A vulcanizing outfit is an accessory that can easily be stored in the tool box. It takes no longer to vulcanize an inner tube than it does to stick a patch properly. The vulcanizer has two sides—the concave side shown for outer casings, and the other, which is flat, for inner tube repairs. To carry out a repair to a casing it must be first examined to ascertain if the canvas has been damaged. The damage in Fig. 2 was not so deep as to require taking the casing off, although it is on the side of the tire, and the following different processes, which can be effected while the vulcanizer is heating, must be faithfully carried out in order named to ensure the vulcanization having the desired effect. Fig. 2 shows the method of cleaning a cut C1 with a stick or penknife, as was used in this case, I1, the tire T1 having previously been cleaned off with gasoline around the part C1. With the aid of an oil gun G1 and a piece of rag R1 and some gasoline the cut can be cleaned in a short space of time, and half the battle rests right here, for cleanliness in this operation is essential, and unless rubber is clean it will not vulcanize, or if it looks apparently good it will not last. The next thing to do is to cover well every part with the compound S1. This should be stirred before using and applied with some instrument T1 in the manner indicated in

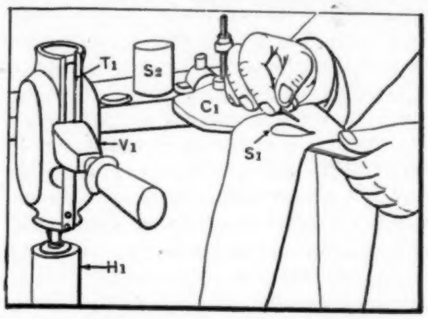


Fig. 7—Applying a thin coating of rubber solution to the lips of a cut in an inner tube

Fig 3, so that the inside of the cut C1 is entirely covered. Allow the first coat to dry, which takes about two or three minutes, and apply another coat lightly over the first. Fig. 5 shows how the Para rubber P1 is cut in strips and forced into the cut C1 with the instrument I1; the cut should be well filled but not quite to the level of the tire, and as the rubber is soft and gives to the instrument it can be pushed right home into the cut.

During these operations the vulcanizer will have had time to heat, and should register on the thermometer T2 265 degrees. To set the vulcanizer V1 for heating attach the burner H1 by the setscrew H2, shown in Fig. 11, with the wick protruding about one-quarter of an inch, and it will give a flame 3 inches high; see the damper works freely before lighting lamp. The temperature is controlled by a thermostat that opens and closes the damper, more or less, as may be required, automatically. In case adjustment of the thermostat seems necessary the method of altering same will be shown later.

With the vulcanizer at the proper temperature, a small piece of wax paper W1, commonly known as grease paper, is inserted between the vulcanizer V1 and the part to be repaired, and snugly clamped on by the chain and bolts B1 and B2, Fig. 11. Should the section of the tire be smaller than the concave shape of the vulcanizer, let out sufficient air for the two surfaces to properly touch. There is no fear of burning one's self if the handle H1 alone is touched, and the length of time required to effect the repair depends upon the depth of the cut; this varies from 20 to 40 minutes.

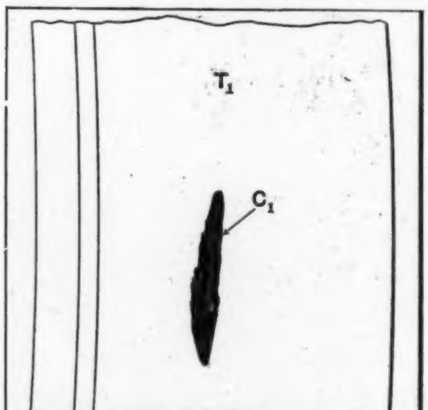


Fig. 8—Showing a cut in an outer casing before the various processes of vulcanizing are carried out

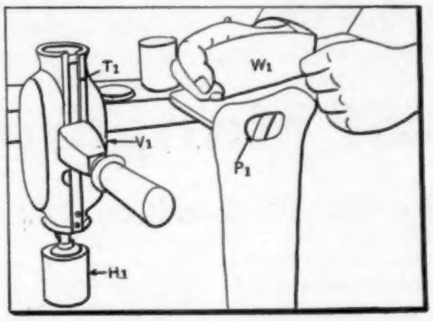


Fig. 6—Applying a piece of paraffin paper over a patch on an inner tube to prevent it sticking to the vulcanizer

If the finger nail pressed on the vulcanized part leaves an indentation the work is not completed, but if no mark is left then the work is finished and the rubber cured. When the vulcanizer has been removed and the part allowed to cool off some sandpaper might with advantage be used to clean around and level off the repair of the same thickness as the casing.

Cleanliness in connection with tube repairs plays an equal part if the work is to be crowned with success, as with the outer casings the rubber must be cleaned with gasoline as shown in Fig. 4, holding the cut open in order to better get at the job. The part must be roughed up, and the best way to do this is to use sandpaper. The cloth C1 is moistended with gasoline and rubbed over the hole and about an inch around, the plate P1 being used as a rest, while the vulcanizer V1 rests on the bracket alongside. Apply, as in Fig. 7, thin coating of cement solution S1 over the hole and on the lips of the same and allow to dry; this takes about four minutes, and then apply another coat of solution and let dry as before. If a simple puncture, take a small piece of Para rubber and work it into the hole with a match. If a small hole, fill to surface with layers of Para rubber cut to size of hole, making sure the Para sticks to the tube around the edge. Then cut a piece of rubber one-eighth of an inch larger than the puncture or cut and apply over same. Then cut another patch P1 one-half inch larger than the hole and apply over all (Fig. 6). The tube is now ready for vulcanizing. By this time the temperature should have reached 265 degrees if the thermostat T1 is

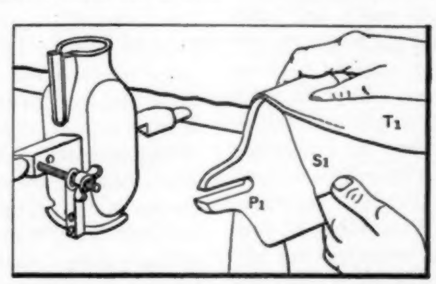


Fig. 9—Inserting strip of old rubber, in order to relieve edges of the tube from pressure and concentrate it on the patch

correctly adjusted. The method of adjusting this, should it require same, is to loosen the locking screw and turn the adjusting screw in to raise and out to lower the temperature. Do not make more than one-fourth turn at one time, and do not expect temperature to change immediately when you make the adjustment. Apply a piece of paraffin paper W1 (Fig. 6) over the patch to prevent it sticking to the vulcanizer, and underneath, next the plate P1, which has been turned in a vertical position, insert a strip of pasteboard or rubber (a piece of an old tube will do) several times larger than the patch, but narrower than the flattened tube, so as to bring the pressure on the patch and relieve the edges of the tube from pressure (Fig 9).

Clamp the vulcanizer to the plate with the tube inserted, leaving the heater alight. When the repair is effected, which takes from 15 to 20 minutes, the patch should have a gray color and should not retain an impression from a finger nail. If it looks brown and stays dented put it back in the vulcanizer and leave for a longer time. Remove the paper by rubbing with a wet cloth.

The repair complete should take about 20 minutes from the time the tube is taken out of the tire, and no amount of pulling should be able to dislodge it after cooling, and examination has shown that the patch has virtually become part of the tube.

Other Forms of Vulcanizers Find Favor in Practice—There are various types of vulcanizing appliances to be had; some of them are large and cumbersome, depending upon the heat from steam, under pressure, to afford the desired warmth; this class of vulcanizers is used in the plants where tires are made; room and bulkiness are not important factors there, but in the owner's garage it is scarcely to be supposed that a steam vulcanizer would lend facility to the plan. Electric vulcanizers, under the circumstances, are looked upon with much favor, and, since they afford the desired amount of heat at the right temperature, if they are properly designed, all that remains is to procure and use them with the assurance that the tire bill will be very materially reduced, provided, of course, that the work is promptly done.

The principle of the electric vulcanizer is that of the electric heater or rheostat. It is made up of a shell of metal holding a set of electric conductors, they being relatively high in resistance. When the electrical energy is connected to the vulcanizer through wires leading from a proper source, as an electric light wire of the right voltage, by attaching the two wires to the binding posts of the vulcanizer, the electric current that will flow through the resistance wires, as they are called, will deliver up its energy in the form of heat, and the amount of heat generated will be sufficient to raise the temperature of the vulcanizer to about the point of vulcanization of the rubber compound. A means is available for regulating the flow of electric current, and a thermometer is

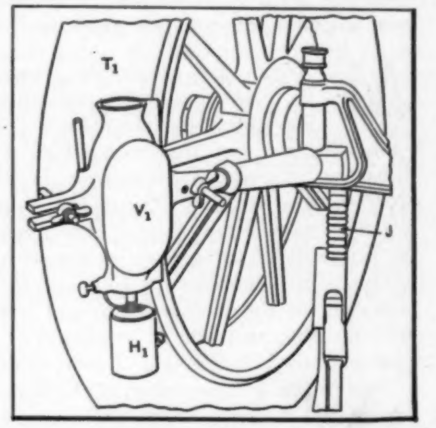


Fig. 10—Showing the method of adjusting a vulcanizer to a tire to repair a cut near the rim

also provided for the purpose of reading the temperature at any time during the process of vulcanization. It is desirable to avoid having the temperature crawl up too high, and the repairman should watch out for this. The thermometer should be a "corrected" one; that is to say, it should be one that has been tested to make sure that it will read off the true temperature within very narrow limits.

For this class of work there are certain tools that will be of excellent service, and the wisest way to purchase an outfit is to include the tools.

Why Cylinders are Beveled at the Bottom.—When the piston is being put back into the cylinder the piston rings will be in the expanded position, and without the bevel it would be almost impossible to insert the piston without at least damaging the rings. With a suitable bevel and the use of two pieces of flat steel, the pistons may be put back into the cylinders, and the rings will close in without trouble.

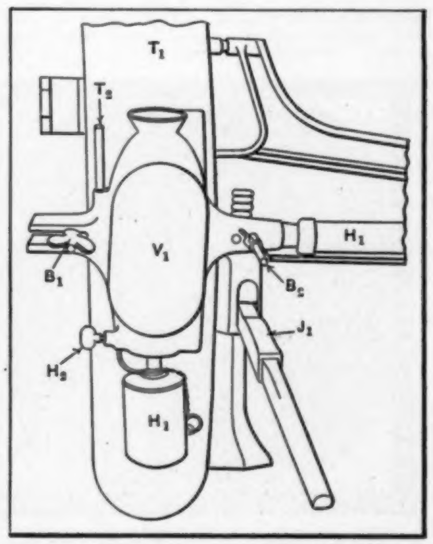


Fig. 11—When the wound is located at the center of the tread the vulcanizer is clamped on by means of bolts at either side

The Effect of Manganese in Steel

By E. F. Lake, M. E.

Dealing with the benefits to be derived from the admixture of proper proportions of manganese in the making of steel, such as minimizing the formation of blow-holes, increasing the tensile strength and hardness, giving greater plasticity and mobility to the metal at forging heats, etc., and giving some idea of the proper percentages to use in making steel designed for various purposes.

MANGANESE principally occurs in nature in the form of black oxide of manganese, otherwise known as manganese dioxide (MnO_2). It is hard and brittle and looks like the cast iron with which it is usually combined to form the ferro-manganese and the ferro-silicon-manganese that is used in steel making. As it has a greater affinity than iron for both oxygen and sulphur, ferro-manganese containing about 80 per cent. of manganese is used in steel making as a deoxidizer and to neutralize the sulphur. It seizes the oxygen that is dissolved in the molten metal and transfers it almost entirely into the slag as oxide of manganese. The sulphur would also pass entirely into the slag if time enough were allowed.

The length of time required, however, makes it commercially impractical to reduce the sulphur to a trace in this way and other materials are used to further reduce the sulphur in the finer grades of steel. It required about four times as much manganese as there is sulphur present to reduce this latter element to the percentages required for automobile steels, and hence if the original sulphur content is very high a very large amount of manganese is required. It unites with the sulphur to form a manganese sulphide that shows in dark spots similar to those shown in Fig. 1, when the steel is polished, etched and microscopically examined. In rolling, these dark spots of manganese sulphide lengthen out into streaks, which of themselves are not very injurious to steel. If the manganese sulphide is segregated with phosphide of iron, however, it will probably weaken steel more than any other impurity. Rolling magnifies the sulphide by separating it out and thus the effect is much more injurious in the rolled steels.

Manganese benefits steel in other ways than that of a purifier, and the amount that can be left in varies and with the amount of various other ingredients; this is especially true of carbon.

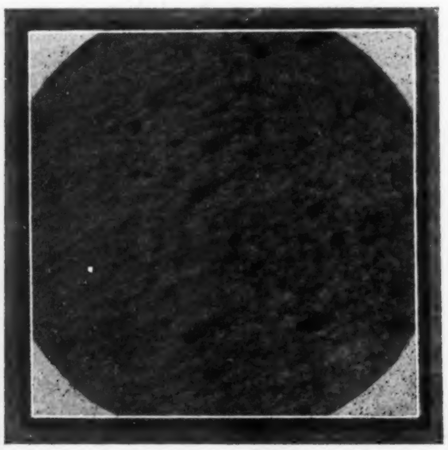


Fig. 1—Black spots show manganese sulphide in a 2 per cent. manganese steel. Magnified 300 diameters

Manganese has practically the same effect on steel as does carbon, and also nickel; but not in the same strength. To equal the effect of 1 per cent. of total carbon, that contains the maximum amount of hardening carbon, it would require 7.25 per cent. of manganese and 17.55 per cent. of nickel. With all three of these elements, there is caused a structural change in the metal from pearlite, that includes the sorbitic, to martensite, that includes the troostitic, and then to the polyhedral structure and with neither of them is a special carbide formed. Chromium has an analogous effect, but not as complete as a double carbide of iron and chromium form, and this cannot be maintained in solution in the iron without tempering.

The effect of manganese was not thoroughly understood until about twenty years ago. It was then shown that if more than 2.00 per cent. or less than 6.00 per cent. of manganese was present in a steel containing less than 0.5 per cent. of carbon, it becomes so brittle it could be powdered under a hand hammer. From 6 per cent. up, this brittleness gradually disappears until at 12 per cent. the former strength returns; its maximum being reached at 14 per cent. These higher percentages of manganese make steel so very tough it cannot be machined with any of the tool steels we have at present, and grinding has to be resorted to. In Fig. 2 is shown the network structure that forms in steel when the managese content is around 13.00 per cent. This makes a metal that will withstand frictional or abrasive wearing action much better than any steel in existence. It has been tried for various parts of motor cars but has been found of little use in their construction.

Each increase in the manganese percentage of steel increases the critical temperature to which it is safe to heat the metal. This is due to its having a great resistance to the separation of the crystals in cooling the metal from a liquid state. It thus confers on steel the quality of hot ductility. It aids in producing more uniform alloys and tends to make the steel crystals small. It makes the metal plastic and counteracts the tendency toward crystallization that phosphorus causes. With the high manganese percentages, however, steel is not liable to crack when heating or suddenly cooling it from a red heat. It overcomes many of the evils inherent in steel by healing them up and producing a smoothly rolled surface.

Some recent experiments brought out the peculiar fact that when 5 per cent. of manganese was added to a highly magnetic pure nickel-iron alloy, containing from 12 to 13 per cent. of nickel, it became as non-magnetic as brass. While nickel also makes a non-magnetic steel when added in certain proportions, it was not known that manganese had this effect upon nickel.

Manganese retards the formation of blow-holes, though not to the extent that silicon does, by preventing the oxidation of carbon and thus the formation of carbonic oxide. This it does by increasing the solubility of the gases that are dissolved in the steel when it is molten and retained in it while solidifying. It probably raises the

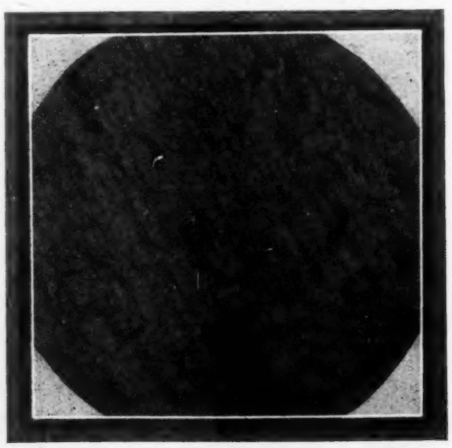


Fig. 2—The network shows manganese formation in a 13 per cent. manganese steel. Magnified 300 diameters

elastic limit and slightly increases the tensile strength; adds fluidity to the metal; increases hardness; furnishes fusibility when present in considerable quantity; and gives greater plasticity and mobility to the metal at forging heats. Some recent investigations, however, make it doubtful that it diminishes ductility to any extent.

Manganese alloys with iron in all ratios, it being reduced from its oxides, at a white heat, by carbon. Its presence increases the power of carbon to combine with iron at a very high temperature (about 2,550° F.) and almost entirely prevents its separation into graphitic carbon at the lower temperatures. Manganese permits a higher total of carbon by raising the saturation point and it is easily separated from iron by oxidation, as it is even oxidized by silica. While it does not counteract cold shortness, it does prevent the red and yellow hot shortness caused by sulphur.

In ordinary steels the percentage of manganese is usually from 0.50 to 1.00 per cent. In many of the special alloys it is from 0.30 to 0.50 per cent. In nickel steel it varies from 0.50 to 0.80 per cent. and in chrome-nickel steel from 0.30 to 0.60 per cent. In the high speed steels its content is from 0.10 to 0.30 per cent. and in steels that are to be carbonized, the manganese should be kept below 0.20.

Improvised Soldering Irons—An excellent substitute for a soldering iron is the steel handle of a wrench or the blade of a screw-driver, the handle or blade being cleaned and tinned in the same manner as the regular iron. By keeping a wrench with the handle ready tinned, the soldering iron can be dispensed with.

Prague Show a Success

One American car among the exhibits attracted much favorable comment. German, Italian, Belgian and French makers now have a monopoly of this field, but with proper trade methods there is no reason why our makers should not effect a lodgment there.

PRAGUE, Austria, came to the front signally during the annual automobile exhibition held there and which has just closed. Jungbunzlau and Prague, Bohemia; Neustadt, Austria; Reichenberg, Bohemia; and Gratz, Austria, manufacturers put up attractive exhibits. There was also an American car which attracted favorable comment. The European models were many of them expensive.

Prague is the capital city of the kingdom of Bohemia, and at the last census showed a number of inhabitants equal to one-quarter million. There are at this date 600 automobiles registered in the Prague police district. Sanguine-minded people say that the number will be doubled within the next year. The German, Italian, Belgian and French cars are now in the lead. American manufacturers contemplating a market in this section of Austria, must needs send catalogues printed in the native language. Besides, illustrations of parts, technical information relative to the parts and the general construction of the machine, as well as terms of sale, are absolutely indispensable. Manufacturers are obliged to pay an import duty per each 220 pounds, of $30.45 on cars weighing less than 880 pounds; $24.36 on 880 to 3,960 pounds; $20.36 on 3,960 to 7,040 pounds; and $12.18 for each 220 pounds over 7,040 pounds.

Calendar of Coming Events

Handy List of Future Competitive Fixtures

Race Meets, Runs, Hill-Climbs, Etc.

June 10............West Haven, Conn., Shingle Hill Climb, Automobile Club of New Haven and Yale Automobile Club.
June 10............Philadelphia, Sociability Run for Electrics, Quaker City Motor Club.
June 10-11........Chicago, Ill. (Hawthorne), Track Races.
June 14............Buffalo, N. Y., Orphans' Day, Automobile Club of Buffalo.
June 15-16........Chicago, Ill., Reliability Run, Chicago Automobile Club.
June, 15, 16, 17....Dayton, O., Midsummer Meeting Society of Automobile Engineers.
June 17............Guttenberg, N. J., Track Races.
June 17............Ossining, N. Y., Hill Climb, Upper Westchester Auto Club.
June 17............Portland, Me., Hill Climb, Maine Automobile Association.
June 19............Des Moines, Iowa, Annual Tour, Hyperion Field and Motor Club.
June 20-23........Detroit, Mich., Summer Meeting National Gas and Gasoline Engine Trades Association.
June 24............St. Louis, Mo., Reliability Run, Auto Club of St. Louis.
June 30............St. Louis, Mo., Reliability Run, St. Louis Automobile Manufacturers' and Dealers' Assn.
June ....Denver, Col., Reliability Run, Denver Motor Club.
June ....Norristown, Pa., Hill Climb, Norristown Auto Club.
June ....Oklahoma, Reliability Run, Oklahoma Auto Association.
July 1 or 8........Baltimore, Md., Hill Climb, Automobile Club of Maryland.
July 4.............Bakersfield, Cal., Road Race, Kern County Merchants' Association.
July 4.............Denver, Col., Track Races, Denver Motor Club.
July 4.............Detroit, Annual Track Meet, Wolverine Automobile Club.
July 4.............Pottsville, Pa., Track Races, Schuylkill County Centennial.
July 5-22..........Winnipeg, Man., Fourth Canadian Competition for Agricultural Motors.
July 7.............Taylor, Tex., Track Races, Taylor Auto Club.
July 8 or 15.......Philadelphia, Track Races, Belmont Park, Norristown Auto Club.
July 14............Philadelphia, Commercial Reliability Run, Quaker City Motor Club.
July 14-17.........Reliability Run, Minnesota State Automobile Association.
July 17-19.........Cleveland, O., Three-Day Reliability Run of the Cleveland News.
July 17-22.........Wisconsin Reliability Run, Wisconsin State Automobile Association.
July ....Amarillo, Tex., Track Races, Panhandle Auto Trade Association.
Aug. 1.............Chicago, Ill., Commercial Reliability Run, Chicago *Evening American*.
Aug. 3-5...........Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 12............Philadelphia, Reliability Run, Quaker City Motor Club.
Aug. ....Denver, Col., Hill Climb, Denver Motor Club.
Sept. 1............Chicago, Ill., Commercial Reliability Run, Chicago Motor Club.
Sept. 1............Oklahoma, Reliability Run, *Daily Oklahoman*.
Sept. 4............Denver, Col., Track Races, Denver Motor Club.
Sept. 7-8..........Philadelphia, Track Races, Philadelphia Auto Trade Association.
Sept. 7-9..........Hamline, Minn., Track Races, Minnesota State Automobile Association.
Sept. 12-13........Grand Rapids, Mich., Track Races, Michigan State Auto Association.
Sept. 15...........Knoxville, Tenn., Track Races, Appalachian Exposition.
Oct. 3-7...........Danbury, Conn., Track Races, Danbury Agricultural Society.
Oct. 9-13..........Chicago, Ill., Thousand-Mile Reliability Run, Chicago Motor Club.
Oct. 16-18.........Harrisburg, Pa., Reliability Run, Motor Club of Harrisburg.
Oct. ....Denver, Col., Track Races, Denver Motor Club.
Nov. 1.............Waco, Tex., Track Races, Waco Auto Club.
Nov. 2-4...........Philadelphia, Reliability Run, Quaker City Motor Club.
Nov. 7-10..........Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 9-11..........San Antonio, Tex., Track Races, San Antonio Auto Club.
Nov. 30-Dec. 2, 3...Los Angeles, Cal., Track Races, Motordrome.
Dec. 25-26.........Los Angeles, Cal., Track Races, Motordrome.

Foreign Fixtures

June 1.............Bucharest, Roumania, Speed Trials.
June 4.............Trieste, Austria, Hill-Climb.
June 18............Boulogne, France, Voiturette and Light-Car Road Races.
June 25............French Light Car Race, Coupe des Voiturettes, Boulogne-sur-Mer course.
June 25-July 2.....International Reliability Tour, Danish Automobile Club.
July 5 (to 20)......Start of the Prince Henry Tour from Hamburg, Germany.
July 9.............Sarthe Circuit, France, Grand Prix of Automobile Club.
July 13-20.........Ostend, Belgium, Speed Trials.
July 21-24.........Boulogne-sur-Mer, Race Meet.
Aug. 6.............Mont Ventoux, France, Hill Climb.
Sept. 2-11.........Roubaix, France, Agricultural Motor Vehicle Show.

THE AUTOMOBILE

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GETTING at the facts in the operation of freight automobiles is not a simple undertaking in the absence of authentic records, of which there are too few to make the task an easy one. Those who rank high in experience, and who are able to show a fair measure of success, are authority for the statement that speed of travel of these automobiles should be high enough to infringe somewhat upon the life of the car in each case, in order that the labor item chargeable to loading and unloading may be kept within fair limits. Striking a balance between the cost of repairing cars, considering any increase in the cost of maintenance that may be due to speed beyond a certain point, and a reduced cost of labor for loading and unloading, is the difficult thing to do. In the leading article in THE AUTOMOBILE this week the "minute method" of accounting for the performance of freight automobiles is taken as the underlying principle, and the cost of running the various types of cars over a considerable period of time, based upon actual records, is shown.

* * *

PESSIMISM seems to reign over the activities of a large number of the makers of automobiles when reference is had to racing and to sporting events generally. Even the Glidden Tour has to be set back on account of the lack of enthusiasm that is being displayed by the makers of automobiles, only a "corporal's guard" of them having indicated that they would care to participate in this event at the time that it was set to be conducted, and we wonder whether or not the officials who were charged with the carrying out of this important matter realize why it is that failure besets their path at every turn. A few years ago when the necessity of selling automobiles confronted the makers thereof it was recognized that to a considerable extent the influence for purchasing depended upon the making of a favorable impression, it being the case that almost half of the buyers could do very well without cars were they so inclined—advertising was the missing link.

* * *

MAKERS of automobiles when they were confronted by the necessity of advertising were observant enough to see that "publicity" had a certain potential force that is not present in the conventional form of advertising. To obtain a favorable mention under observed conditions, as in racing or other contests, was a good idea. But in the course of time abuses crept in until finally a favorable impression was hardly to be expected as the result of participating in scandals, of which the sporting events in later years were largely made up. It was proposed to revise the whole matter, revamping the status of contests and racing generally, the idea being to make the rules of such a rigid character that it would be impossible to pull the wool over the eyes of the purchasing public. This project made considerable headway, and it looked for a time as if 1911 contests would be on a more successful level than those of any of the previous years.

* * *

SINCE advertising is what the makers of automobiles hope to get out of supporting "events," it is a moral certainty that they will not support efforts that do not promise a fair return, and, referring to the Glidden project, certainly the "pathfinder" effort this year fell on deaf ears. When a comparison is made between the thousands of inches of editorial mention that was given last year to the "pathfinder" work as compared with the dull mention that this year's effort brought forth, the reason for the lack of enthusiasm of the makers of cars is laid bare. Just why the newspapers looked askance at the plan that was put into force this year has not been fully explained, but there is one point that should not be overlooked in the search for the true explanation. The controlling body, instead of putting its effort into the proper running off of the pathfinder project, evidently tried to kill two birds with one stone, and the attempt to map tours as a part of the effort is responsible for the early date that was fixed for the pathfinder trip—this was a mistake.

* * *

NOTHING remains at the present stage of the sporting situation but to accept the inevitable, and the makers of automobiles must be content to do without a large volume of favorable mention matter. Moreover, this loss will be made permanent unless confidence can be aroused, the character of which will carry conviction, to do which may require a complete reorganization of the whole situation, even to the extent of the entire elimination of such of the men who are in control whose prime business it is to make money for themselves and to make enemies for the automobile business by playing politics and trying to extend the régime of the "game," of which the automobile business has had enough, and to spare.

Dove of Peace Hovers Over Glidden

"Good of Industry" to Influence Settlement

Negotiations looking to a settlement of the fight over the Glidden trophy of 1910 have progressed to such a stage that it is almost certain that the court proceedings will be withdrawn next week, thus putting an end to the acrimonious wrangle that has been carried on for a year. The general good of the industry is the moving cause for the contemplated action by the litigants, but the basis of compromise has not been made public in advance of a final ruling by the New York Supreme Court.

WITHIN one week, unless all signs fail, the muddle over the award of the Glidden Trophy in 1910 will be settled, and settled out of court at that. The squabble has been harmful to the industry and the outcome of the matter is that all sides have agreed that the "good of the industry" really deserved to be a factor in the matter and that for general results, the case should be settled.

Wednesday morning, attorneys representing H. O. Smith, complainant in the case and the Contest Board and the Chalmers Motor Company, defendants, appeared before Judge Marean and moved for a continuance for one week. This motion was granted and the proceedings were given and another stay.

Negotiations have been in progress for some time looking to a settlement and it may be said with some certainty that the agreement contemplates in substance the voluntary withdrawal suggesting the thought that a happy way has been discovered out of the difficulty.

The case has been full of bitterness ever since the Glidden Tour referee awarded the trophy to the Premier entry after a tour of unprecedented severity. The Contest Board reversed the ruling of the referee and awarded the cup to the Chalmers contesting car that had the next best score on the alleged grounds that the Premier company failed to prove that its car was strictly within the rule covering stock cars.

A temporary injunction was denied to the Premier company in the courts and the case came to trial on its merits on April 5.

The claim of the Premier company was to the effect that it had complied with all the formalities prior to the start of the tour; that its car checked up with its stock car certificate furnished to the Contest Board; that the Contest Board passed the car and by allowing it to start in the tour, tacitly agreed that the car was eligible. Then after a terrific trial over roads that were excessively severe upon the cars, the Premier car finished with the lowest score. On these general grounds Judge Marean declared that the Premier company was entitled to the cup; providing that no positive fraud was used in gaining entrance to the contest. After hearing some testimony, Judge Marean postponed the further hearing until yesterday to give the Premier company an opportunity to furnish the court with a list of purchasers of Premier cars between May 1 and June 14, 1910, in order that the court might reach a conclusion as to the stock status of the contesting car. It was the intention of the court to take depositions as to the details of the cars in question from the owners themselves. The list of owners proved to be exceedingly scattered and the work of sifting the matter appeared to be of much magnitude.

In this condition matters settled themselves and as everybody connected with the fight was tired of it and as there appeared to be no possible good that could result, the parties at issue began to feel out the situation, with the result that in all probability a motion will be made next Wednesday before Judge Marean to withdraw the whole case.

Glidden Postponed; Circuit Wiped Out

With a single sweep the Glidden Tour scheduled for June 21 was indefinitely postponed and the National Automobile Racing Circuit was wiped out clean by action of the Contest Board this week. The tour may be run off over the route selected beginning September 6, if enough 1912 cars qualify for it and desire to enter the contest.

As for the racing circuit idea, it "blew up," as one of the prominent officials termed it. The facts in the case are that when Chairman S. M. Butler called a meeting of sixteen presidents of automobile companies during his recent visit at Indianapolis, he learned at first hand that the manufacturers could not see any advantage in participating in the circuit enterprise.

When Chairman Butler discovered the actual conditions he promptly cut out the idea from the sporting program of the year.

The situation at present from the sporting point of view is somewhat bare in the vicinity of New York, but the most positive assurance is now given that there will be plenty of sporting events staged in and near the metropolis this season.

Big Truck Parade for Quakers

PHILADELPHIA, June 5—One hundred and fifty-six commercial vehicles already entered, representing 45 different makes, and capable of carrying loads anywhere from 800 pounds to 6 tons, with every reason to believe that this total will be doubled at starting time, give a fair idea of the comprehensiveness of the motor truck parade and exhibit to be conducted here on Thursday by the Philadelphia *Inquirer*, with the co-operation of the Philadelphia Auto Trades Association.

All types, sizes and makes will be represented in line, demonstrating the wide range covered by this modern means of transportation of merchandise and the variety of businesses to which it is adaptable. By far the greater number of the entries are of cars in actual service, some being demonstrating cars.

In fact, after the procession through the city proper, many of the cars will return to their various fields of service. All those not required to return for duty will proceed to Narberth, where an exhibition will be held at the Belmont Driving Park.

Gage Resigns Carhartt Management

William M. Gage, general manager of the Carhartt Sales Co., has resigned that position and has been succeeded by John V. Schenck. Mr. Gage owns the United States Hotel at Saratoga and while he still retains a large financial interest in the Carhartt company, he will devote his attention to a greater extent to the management of the hotel property.

Packard Will Have Yearly Models

Yearly models will be continued by the Packard Motor Car Company, as in the past, despite the attitude of a number of manufacturers who have stated that in future the designation of their cars would not bear the number of any particular year.

Cheering Orphan Regiments Enjoy

Rain Fails to Spoil New

(A)—A comfortable tonneau load of the fair guests of the day. (B)—Room for more in a truck that had not far to go to get them. (C)—Col. K. C. Pardee in all of his glory as the father of the project. (D)—As the forces gathered—showing a goodly sprinkling of freight automobiles. (E)—A mass of little humanity in the automobiles that were assembled at Union Square

Under leaden skies which later poured a mournful drizzle upon the thousands of guests, the annual Orphans' Day outing at Coney Island lost none of its savor. It was a big success despite the rain and one of the most telling features of the affair was the presence in line of an immense number of heavy trucks, each with its full load of happy children. The beneficiaries were entertained at luncheon by Benjamin Briscoe and swarmed the attractions of Luna Park during the afternoon.

WITH a hearty enthusiasm that was not decreased by leaden skies at the start and was not dampened by the cheerless drizzle that came along later in the day, thousands of New York orphans enjoyed their annual outing at Coney Island yesterday as the guests of the Orphans' Automobile Day Association of New York.

Just how many of the little ones took part in the merrymaking was not definitely ascertained, but from the immense number of big trucks that were in line loaded to the guards with cheering boys and girls, it is estimated that there were several hundred more than last year.

At the last minute the disagreeable weather served to turn a few back, but taking the affair as a whole it was a big success in every way except the rain.

The start was made with promptness, the right of the line resting on Seventy-eighth street and Broadway. The course was south on Broadway, picking up the various divisions that were parked in the cross streets between Seventy-second and Seventy-eighth. The first section stretched out in a tremendous line moving southward and began to pick up the second section at Seventeenth street and Fifth avenue. It required nearly an hour to pass a given point with the machines moving smartly.

The course carried the procession through the Washington Arch and then east and south to the Williamsburg bridge. Through Brooklyn to Coney Island the procession moved via the usual automobile route, making a mileage of 18.2. Luna Park was the objective point and all the children reached this shelter before the rain began to drizzle down.

At the resort everything was free to the children and they enjoyed the privileges to the full. After a preliminary investigation of the wonders of the place, the kiddies were herded into the big ball room, where a filling luncheon had been provided for all hands at the expense of Benjamin Briscoe, president of the

Automobile Outing at Coney Island

York's Most Beautiful Charity

(F)—One of the elements that went to make up the great parade. (G)—Line-up of the automobiles before the picking up of the children. (H)—Some of the little tots in a position to observe the proceedings around them. (I)—Pre-empting the space ordinarily occupied by ten tons of coal. (J)—Brooklyn Eagle sends its battery of automobiles and places them at the service of the committee

United States Motor Company. Substantial eatables and plenty of fresh milk were features of the bill of fare and, when all had consumed as much as he or she required, the whole delegation continued a detailed inspection of the resort in all its phases.

The ride back was a wet one, but as far as could be learned none of the guests seemed to suffer despite the rain and they were tired but happy when they were returned to their various institutions.

Col. K. C. Pardee, president of the association, served as Grand Marshal and was assisted by a large staff.

Chicago Trade Gives Parade

Chicago, June 5—The Chicago Automobile Trade Association held its annual floral parade Saturday, but like several other motoring events scheduled at this time it suffered because of its proximity to the 500-mile race at Indianapolis. Still, the local dealers made a most creditable display under the circumstances, turning out fifty decorated cars and trucks.

The parade followed the south and west side boulevard systems and finished at Grant's park on the lake front, where a gymkhana was held on the big tract of land east of the Illinois Central tracks. The judges, cartoonists on the local papers, viewed the parade and then awarded first prize to the White Co., which had a car decorated in white paper chrysanthemums and representing an aeroplane. Second prize went to the Thomas B. Jeffery Co., which showed a Rambler which carried a big white ram astraddle the hood, while a number of pretty young women occupied the tonneau of the car.

The McFarlan Six entered by Mrs. C. A. Coey was awarded the prize for the best decorated car in natural flowers, the decorations consisting of a great quantity of pink peonies. In this division second prize went to an Oakland entered by R. A. Wadsworth. In the owners' division the Stoddard-Dayton of H. G. Koenig caught the eye of the judges and the first prize.

The prize for the most novel decorated float went to the Studebaker which had an arbor on the truck, with cornucopias at each corner bearing little girls in white, carrying tiny white parasols. The Elmore took second. Henry Paulman had a novelty in this section in the shape of a papier maché elephant, full size, which rambled along on a Pierce-Arrow. Unfortunately the elephant ran afoul of a viaduct and was unable to finish. In the commercial section a White truck carrying a White touring car was considered best by the judges.

Motor Law of West Virginia

IN EFFECT MAY 25, 1911.

REGISTRATION.—A non-resident owner is exempt from registration provided he has complied with the provisions of the law of his residence relating to automobiles and is duly authorized to operate therein. The license number issued by his State must be displayed upon the front and rear of the vehicle. This exemption is effective only to those residing in States granting similar exemption and privileges to residents of West Virginia.

EQUIPMENT.—1. Good and efficient brakes.

2. A speedometer.

3. Suitable bell, horn or other signal.

4. During a period from one hour after sunset to one hour before sunrise must exhibit two lanterns showing white lights in the direction vehicle is proceeding, and a red light visible in the reverse direction.

SPEED REGULATIONS.—1. Never greater than is reasonable and proper, having regard to traffic, use of the highway, etc.

2. In closely built-up sections never greater than 10 miles per hour.

3. Elsewhere in a city or village never greater than 15 miles per hour.

4. Elsewhere outside of a city or village never greater than 20 miles per hour.

5. Upon approaching and traversing a bridge, dam, sharp curve or steep descent, machine must be under control and not exceeding 5 miles per hour.

6. Upon approaching a crossing of intersecting highways do not exceed a speed that is greater than reasonable and proper.

STOP WHEN.—1. At request or on signal by putting up the hand from person in charge of restive horsestop. Use care thereafter in passing. Stop motor upon request or in case horse appear badly frightened.

2. In case of accident stop. Upon request of any person present give name and address, name and address of owner and all persons in the car at the time of the accident.

WARNINGS.—Upon approaching a person walking in the highway or a horse give reasonable warning of approach.

RULES OF THE ROAD.—1. When meeting other vehicle or horse the person operating motor vehicle shall reasonably turn to the right of the center of the road so as to pass without interference.

2. Upon overtaking horse or vehicle pass on the left. Rider or driver shall as soon as practicable turn to the right to allow free passage on the left.

3. At the intersection of public highways keep to the right of the intersection of the centers of such highways when turning to the right and pass to the right when turning to the left.

LOCAL ORDINANCES.—Local authorities may make reasonable speed regulations in cities, towns or villages, but in that event signs must be conspicuously posted at the boundary line thereof indicating the rate permitted. Motor vehicles may be excluded from cemeteries or grounds used for the burial of the dead.

TRIAL.—You are entitled to an immediate hearing, and if such cannot be had then to be released upon giving bond or personal undertaking to appear secured by a deposit equal to the maximum fine for the offense charged, or in lieu thereof by leaving the motor vehicle. The officer making the arrest may receive the deposit, but in that case demand a receipt in writing. In case of conviction $2.00 may be assessed as costs in addition to the fine.

PENALTY.—Fine not exceeding one hundred dollars for the first offense.

OBSERVATIONS.—The act requires all chauffeurs to take out a license and does not specifically exempt non-resident chauffeurs. "Section 16. No person shall operate a motor vehicle as a chauffeur upon the public highways, unless such person shall have complied in all respects with the requirements of the four preceding sections." These sections require him to be licensed and to wear the license badge upon his clothing in a conspicuous place at all times. Fee $2.00.

Common Sense Abrogates Detroit Law

DETROIT, June 5.—The motorists of Detroit are struggling with the new local ordinance recently adopted by the Common Council and which imposes a number of severe restrictions on motorists. The ordinance has been in effect only a little more than a week, but already it has resulted in well-nigh hopeless confusion. More than 500 warrants were sworn out in the first three days in which the ordinance was in force. Then a halt was called and an interpretation of the law made which removed the basis of many of the complaints. Considerable space has been given to the ordinance by the local newspapers in an effort to familiarize the motorists with its provisions.

The ordinance provides that a motorist must bring his car to a full stop before crossing a railroad or street railroad track. This has been informally modified, however, both in the cases of motorists crossing a track parallel to the route they are traveling and in regard to crossings patrolled by members of the traffic squad, who signal.

Highway Convention Will Draw Notables

Improved highways will be the aim of a convention that will be held at Richmond, Va., September 12-15, the first annual congress of good roads to be held under the auspices of the American Association for Highway Improvement. This organization was formed last fall to stimulate public interest in the subject.

The formation of the association followed largely as the result of a meeting of highway commissioners and automobile officials which was called by the Touring Club of America, Broadway and Seventy-sixth street.

The convention next September promises to be attended by an unusual number of all the various elements that are particularly interested in quantity and quality of good roads. Logan Waller Page, Director of the Office of Public Roads, is president of the association.

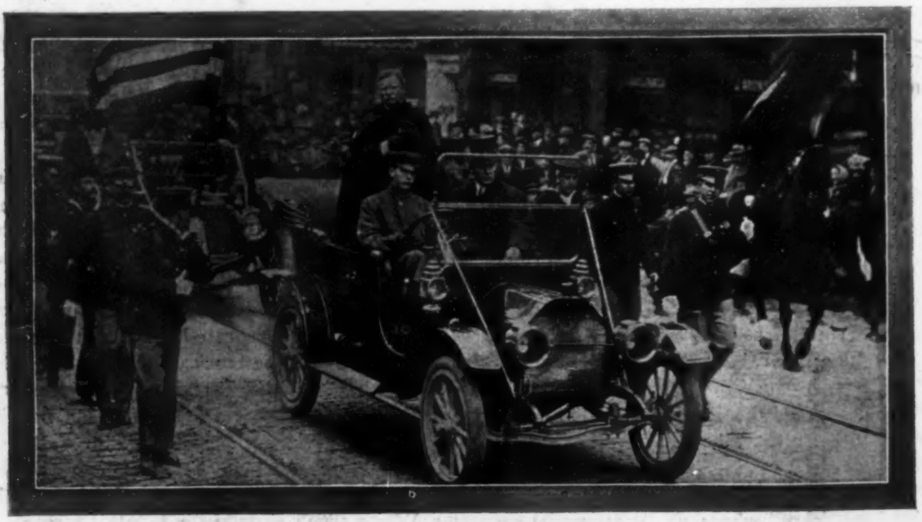
Chinese Wall Being Built Around Jersey

NEWARK, N. J., June 5—Summary measures, directed against two States which refused to grant New Jersey autoists reciprocal privileges, have been taken by Commissioner J. B. R. Smith, of the Jersey Department of Motor Vehicles. Since Wednesday of last week the special eight-day tourist licenses to Delaware and Pennsylvania have no longer been issued. The formal order to licensing agents has already been sent out.

Negotiations, such as were carried on with Delaware and Pennsylvania, are pending with other nearby States, New York included.

Body-Baking Ovens Installed in Garford Plant

CLEVELAND, O., June 5—Fifteen large ovens, each as big as one end of a freight car, have been installed in the new woodworking plant of the Garford auto factory at Elyria, O. These will be used for the "baking" of the auto bodies, wheels and fenders after each coat of paint. The Garford people say this method prevents dust from settling upon the paint. The paint is protected until dry and the effect of the heat is to leave the surface smooth and hard. The Garford ovens are heated with steam coils which give a dry heat of from 150 to 200 degrees Fahrenheit, according to the kind of work being done in them.



While former President Roosevelt was the guest of the Seattle Press Club, in Seattle, Wash., he used an E-M-F "30" continuously during his visit in the northwest city.

Martin at Firestone Factory

Frank H. Martin, for several years manager of the Chicago branch of the Firestone Tire & Rubber Company, Akron, O., has been made special representative, with headquarters at the factory. A. W. Moore, formerly a city salesman of the Chicago branch, has been appointed manager to succeed Mr. Martin, and will soon take up his new work.

Wolverines to Tour De Luxe

DETROIT, June 5.—The Runs and Tours Committee of the Wolverine Automobile Club has issued a booklet containing a full array of advance information concerning its "Affiliation Tour," to be held June 22-30. The booklet contains a full list of hotels and garages along the route and, when used with an entry blank, enables an intending participant to secure bookings at any hotel desired for each night of the tour.

A considerable convenience for the benefit of the tourists will be afforded by a truck, donated by the Alden-Sampson Company, which will transport free of charge a trunk for each of the contestants who desired to travel de luxe, carrying its load along the route of the tour and delivering the baggage nightly to the hotel to which it had been tagged in the morning. Another convenience will be the presence daily of a special tire car. This is provided by the automobile tire dealers of Detroit and will be stocked with a complete set of inner tubes and outer casings. It will start last of all the cars each morning and will afford assistance to any tourist who drops out of line and waits for its arrival. The material will, of course, be sold at the regular price. The labor will be donated. Another hospital car has been entered by the Detroit Automobile Dealers' Association. This will carry a stock of repair parts and two expert mechanics who will donate their services to motorists who come to grief along the route.

The final settlement of the last harassing detail contingent with the crossing of the Dominion frontier was completed recently when the Ontario government promised to honor for four days the license tags issued by the States from which the tourists will come. This obviates the necessity for taking out separate licenses on crossing the border. The Canadian law requires licenses for both car and driver.

Starts each morning will be with a one-minute interval between cars. Contestants are enjoined not to pass the car immediately ahead unless it has come to a full stop or is five minutes or more behind its schedule.

The preliminary booklet also includes abstracts of the motor laws of each locality to be traversed by the tour.

Shingle Hill Climb Centers Attention

First in importance in the way of sporting events around New York so far this season will be the hill-climbing contest scheduled for next Saturday afternoon on Shingle Hill, West Haven, Conn. This event will be run under the auspices of the Yale and New Haven Automobile Clubs and has been fully sanctioned.

Up to last week the climb was under the shadow of the numerous major events scheduled to be run in various places, but as all these were eliminated at a single stroke when the National Circuit collapsed the Shingle Hill climb immediately assumed a position of great importance.

There will be three motor cycle events, followed by fourteen contests open to Class C, on non-stock cars, really representing seven climbs with a class in each event for both professional and amateur drivers. Then will come six events, each of which will have a professional and amateur section, which will be closed to all cars that do not measure up to stock-car qualifications, *i.e.*, they must conform to Class B rules.

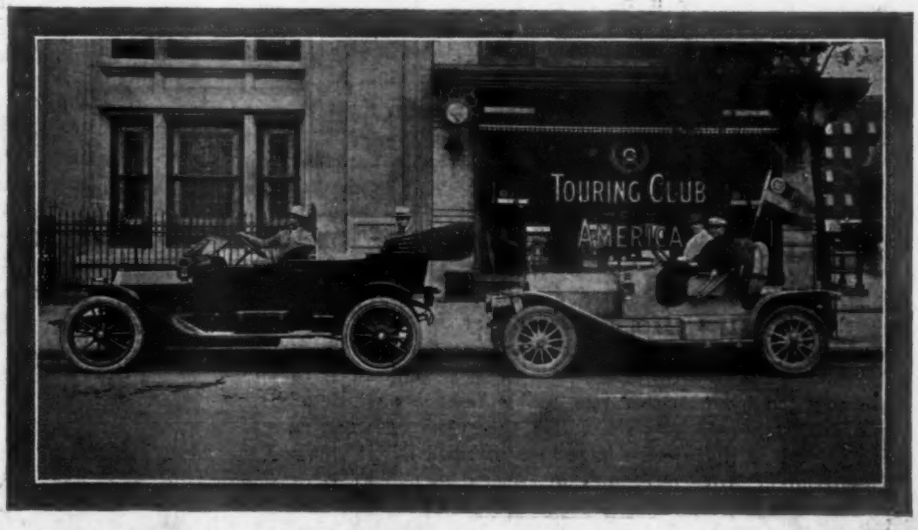
A good entry list has been secured for the non-stock events and a few stock-car races are assured, although the indications are for rather thin fields in most of the events.

Full List of Certified Stock Cars

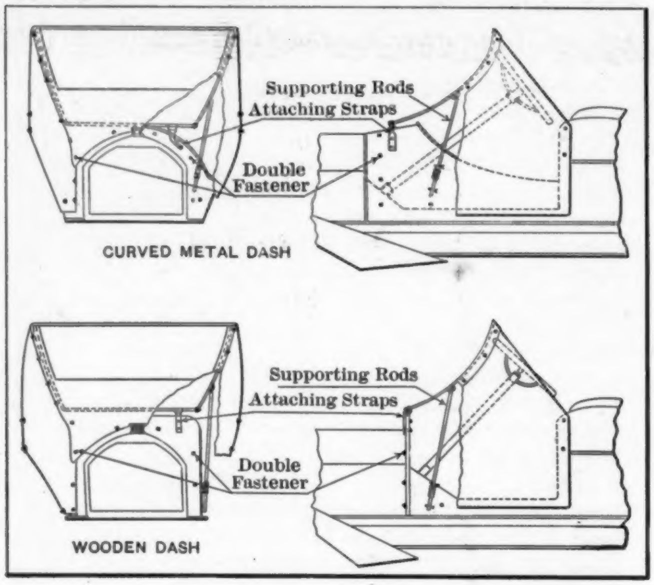
The following cars have been duly certified by the Contest Board as stock cars:

Abbott-Detroit "B-30."
Cadillac "30."
Case "L."
Cartercar "H," "L" and "M."
Clarke-Carter (Cutting) "O" (3¾ x 5) and "50."
Chalmers "9," "L" and "M."
Cole 30 "H Roadster" and "Touring."
Corbin "30" and "40."
Cunningham "H."
Dorris "F."
Empire 20 "C."
F. A. L. "N Touring, 4⅛ x 5¼."
F. A. L. "N Speed Type."
Franklin "D," "G" and "M."
Haberer & Co. (Cino), "40."
Hudson "33" and "20 Roadster" (*100" wheelbase).
Hupmobile "C," "Runabout" and "Touring."
Jackson "30" and "41."
Knox "R" and "S."
Lexington "D" and "F."
Lozier "Type 46" and "Type 51."
Maxwell "EA-GA-GAR."
McFarlan Six "26."
Metzger (Everett "30").
Midland "L."
Moline "M-35."
Motor Car Mfg. (new Parry "37-39-42").
National XXX, "40," Roadster and Touring.
Norwalk "35."
Nordyke & Marmon (Marmon "32").
Oakland "30" and "40."
Pope-Hartford "Portola or W."
Schacht "AA" and "L."
Simplex Auto Co., "50 HP."
Speedwell "11."
Staver Carriage Co., "35" and "35F."
Stevens-Duryea "AA," "K" and "Y."
Streator (Halladay "J-40").
Vandewater (Correja "A" Runabout).
Velie 40 "G" and "H" and "I."
Warren-Detroit "30," "11-C."

*Where no dates are given, models now eligible.



Official cars of the Touring Club of America in front of the Club's headquarters, Broadway at 76th Street, New York, showing Mr. C. P. Cox (sitting beside the driver) in the Touring Club's runabout, just prior to his departure for a two weeks' tour of the roads of New England. Mr. Cox will forward daily reports to the Touring Club, giving detailed road and route conditions as he finds them. These will be displayed upon the bulletin board at the Touring Club of America for the benefit of thousands of motorists who are planning to tour New England this season. In the touring car is A. L. Westgard, the well-known path finder of the Touring Club of America, and in the tonneau, Secretary F. H. Elliott, who escorted Mr. Cox out of the city



Showing method of installing the Ideal wind deflector on cars with either metal or wooden dashes

Installing Ideal Deflector

Protecting the driver of an automobile from the air current produced by a swiftly moving car, without at the same time obstructing his views, was a serious problem up to quite recent times. The windshield here described and illustrated is the solution, and the manner of installing it is given below.

TO get the best result from the Ideal Wind Deflector, its upper edge should be so located as to permit the driver to survey the road in front of him for 50 feet ahead. This arrangement will bring the shield very close to the steering wheel, leaving, however, sufficient clearance for the chauffeur's fingers to operate it, an inch and a half being enough for the purpose. Fixing the horizontal brass rod securely to the dashboard is the next operation after ascertaining the right position of the rod and bending the malleable brass straps into any position necessary to permit the installation of the deflector in the manner determined by the preceding process. The malleable brass straps are long enough to permit of cutting off either end, but since one of these is fitted for being attached to straight wooden dashes, and the other intended for curved metal dashes, it is better not to mutilate them. The manner of fastening the brass straps in both cases is clearly indicated in the illustration, showing also the side-supporting rods in place. It will be noticed that there is also a difference in the manner of attaching these rods in the cases of metal and wooden dashes.

Two sets of cotter pins are seen, and while the upper pins serve to bear on the casting when the shield is in the "driving" position, the lower cotter pins, which occupy a hole three or four inches below the upper ones, are used to check the motion of the supporting rod caused by throwing the shield forward.

The attachment of the various parts having been completed, closely fit the front edges of the deflector to the dash, repeating the procedure with equal care in the case of the side curtains. The corners of the windshield, which overlap the side curtains, are attached by means of two double fasteners which are supplied with the shield. Thereafter the wind deflector is ready for work, and if close fits have been attained of all portions the shield should prove efficacious in service.

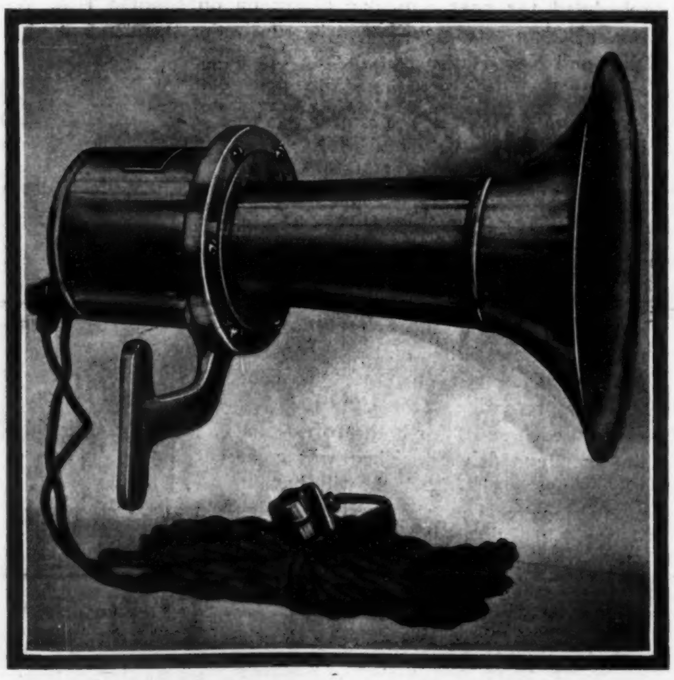
Apple Brings Out New Starting Device

The latest idea emanating from the plant of the Apple Electric Company, of Dayton, Ohio, is based upon the use of the same dynamo that is employed for lighting in the "Aplco" system in the cranking of the motor as well. According to V. G. Apple of the company, this new system, which is now on the verge of completion and marketing, permits the automobilist to start his motor at will by the simple expedient of pressing on a pedal. The broad idea involves the use of a starting motor, the latter taking its power from the storage battery, it being the case that the storage battery is charged by the lighting dynamo during the time that the automobile motor is in operation. Remembering that electric motors are effective torquing instruments, it remains merely to unify the relations of the lighting dynamo and the cranking motor, employing a storage battery of adequate capacity, and mechanically contriving so that the lever advantage will be sufficient for the end. In working upon this scheme the Apple company has had in mind the fact that cranking an automobile motor is not a pleasant task in any event; moreover, 55 per cent. of all the accidents that occur to automobilists are brought about due to the "back-kicks" during cranking which this new system entirely eliminates. This field is rich in worthy possibilities, and the Apple Electric Company is displaying its customary acumen in thus solving the starting problem.

Electric Noise Machine

The unique sound, and its swift effect, produced by the signal which is described below, have made it one of the most popular horns now on the market. The principle applied by its inventor is a decidedly novel one in this line and the same holds of the tune turned out by this device.

IT has been said that the development of speed is an indication of the evolution of human civilization. This being true, and granting that more efficient safeguards become a necessity with increasing speed, new means must be looked for to serve the end. While the call of a cabby or the sound of a whistle are sufficient to warn a pedestrian or operator of another slow vehicle of the arrival of a conveyance traveling at but eight or ten miles an hour, the use of two or three times that speed demand the application of more prompt and efficacious signals. It is not enough to tell the man in front that the automobile is coming and to leave it to his reasoning power as to whether and when he will get out of its way; but a forceful order disturbing his peaceful reflections and bringing about the desired effect will be more to the point.



The Klaxonet, the electric noise machine designed for use on the smaller types of cars

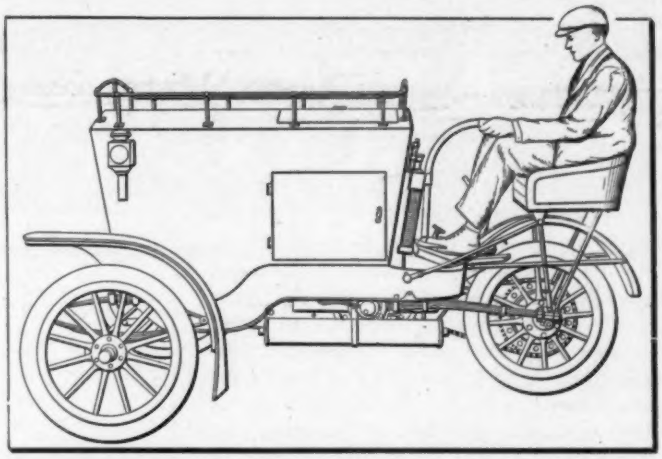
The great majority of signals do not fulfill this condition. But one of the most recent representatives of this family of accessories causes the long-aimed-at effect. The Klaxonet, which is really a small reproduction of the Klaxon, made by the Lovell-McConnell Manufacturing Company, Newark, N. J., has the same piercing quality as found in the sound of the larger apparatus, and serves its purpose, being intended for the smaller class of cars. The case contains an electric motor resting on end-thrust ball bearings, which revolves a toothed wheel striking thereby against a hardened steel button. This action produces the sharp, incisive note of the horn and he who hears it for the first time, and many times thereafter, will surely start out of the path of the coming car.

Motorette Delivery Wagon

The success of the three-wheeled pleasure voiturette in this country has naturally suggested the possibilities of a delivery wagon of the same type, and the makers of the Motorette passenger car have constructed one for freight transport, taking on a load of one-quarter ton, and using a speed that is beyond the range of a bigger car owing to the crowded city streets.

CIRCUMSTANCES, as they vary, do not always present the installation of a big, heavy delivery wagon as the most advantageous form of solving the problem of the retail merchant, and where an amount of goods not sufficient to fill a large wagon is to be delivered within a limited district the want of a small, low-priced and efficient wagon will be felt deeply. Recognizing this situation and its breadth, the C. W. Kelsey Manufacturing Company, of Hartford, Conn., have taken advantage of their experience in building small-sized pleasure automobiles, and have now put on the market their model "N," an illustration of which is herewith offered.

Looking at the figure discloses the same strength and simplicity as is evident in the company's pleasure model. The operator occupies a commodious seat at the rear, while the greater part of the wheelbase is devoted to the package-carrier. This has an area of 48 by 31½ inches and is 27½ inches deep in front, where the frame is dropped to enable the enlargement of the carrier, having its main doors in front, while one smaller door is provided

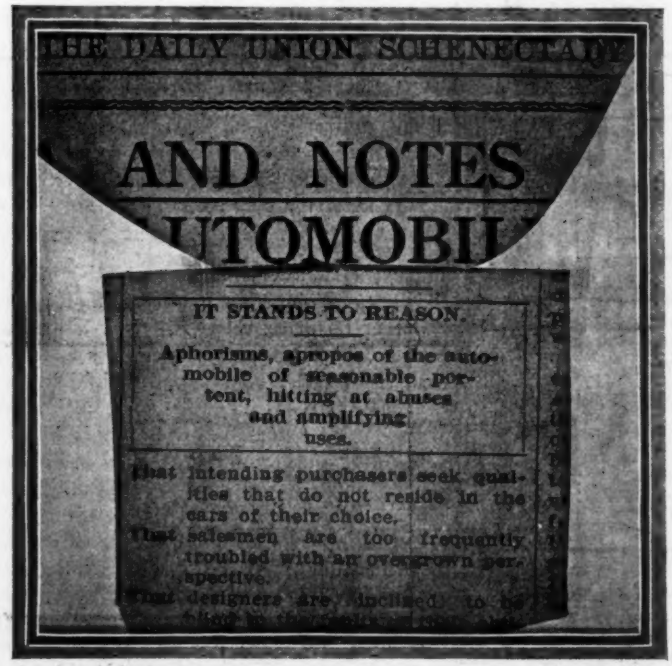


Model "N" Motorette three-wheel delivery wagon with a carrying capacity of 500 pounds

on either side of the body. A door on the top is in specially accessible position with reference to the operator and permits of his taking the topmost parcels out of the carrier without leaving his seat for this purpose. The top compartment, which is thus made specially accessible, is 23 inches long, 31½ inches wide and 7 inches deep.

Opening the side doors permits access to the bottom of the body, consisting of two doors lifting up on hinges. This operation lays bare the engine and transmission, the power plant being about identical with the one used on the passenger Motorette. The chassis is also very similar to the pleasure car frame, the front wheels having a diameter of 28 inches, while the rear wheel diameter is 29 inches, tire section being 3 and 3½ inches on front and rear respectively.

The other details of the delivery wagon correspond also to the pleasure car, as is seen by the steering arm and chain transmission which are shown in the illustration. The seat is directly above the rear wheel, an ample mudguard protecting the driver. The maximum speed of the Model "N" is 20 miles per hour and its carrying capacity is 500 pounds. The price is $500.



THE DAILY UNION, SCHENECTADY

AND NOTES

UTOMOBIL

IT STANDS TO REASON.

Aphorisms, apropos of the automobile of seasonable portent, hitting at abuses and amplifying uses.

That intending purchasers seek qualities that do not reside in the cars of their choice.

That salesmen are too frequently troubled with an overgrown perspective.

That designers are inclined to be

Of the many daily papers that run an "Automobile Section," with few exceptions they give credit to THE AUTOMOBILE for the matter that they use, but here and there the automobile editor seems to think so much of the material that he wishes to claim the authorship thereof—it is a very flattering situation

Grant Decision Affects Carriage Tires Only

AKRON, O., June 5—There seems to be a general impression among men not intimately connected with the rubber tire and automobile trade, that the decision of the United States Supreme Court, which in April of this year declared the Grant Tire patent valid, would affect the business relating to motor truck tires. As a matter of fact, the Grant patent covers only tires for carriages. While it is true that most of the tire manufacturers engaged in the making of carriage tires make auto and truck tires as well, truck and auto tires are not affected by the Supreme Court's decision. The Grant patent has been in litigation since 1896 in various Federal courts. The case decided recently by the highest court in the land was brought by The Diamond Rubber Co. of New York, on a writ of certiorari asking for a review of the decision of the Federal Court of Appeals which had declared the Grant patent valid. The Supreme Court affirmed the decision of the lower court, and it is expected that the Consolidated will now enjoin, ask for an accounting and for damages on the ground of infringement. The principal Grant claim is upon the internal wire fastening.

Fifteen New Goodyear Branches Since Jan. 1

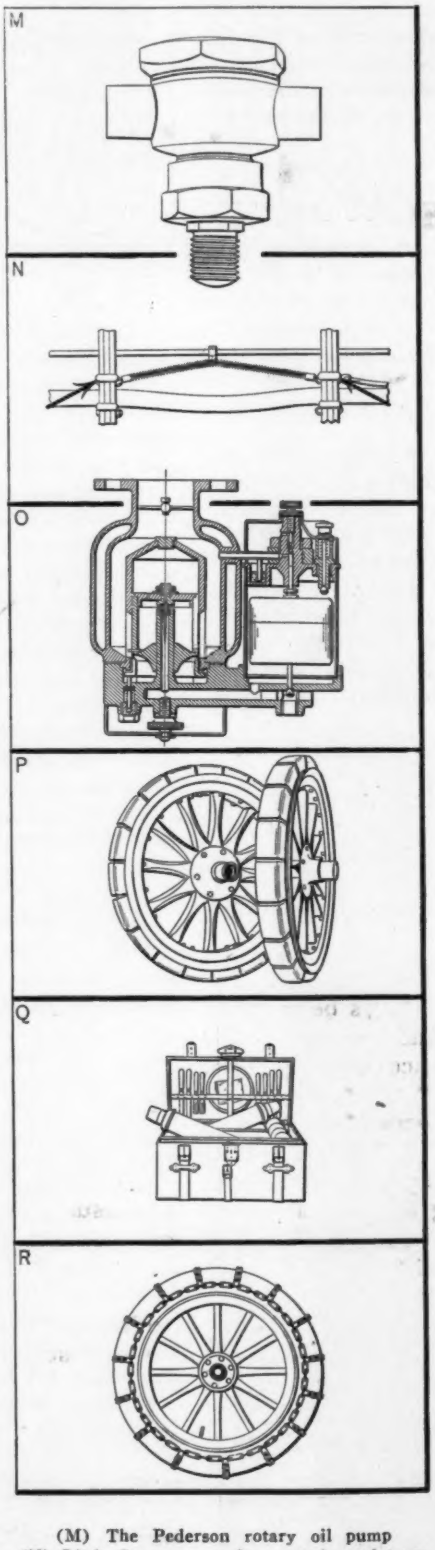
AKRON, O., June 5—The Goodyear Tire & Rubber Co. has opened fifteen new branches in the past half year, in the following cities: Columbus, O., Dallas, Tex., Des Moines, Ia., Fort Worth Tex., Indianapolis, Ind., Jacksonville, Fla., Memphis, Tenn., Oklahoma City, Okla., Portland, Ore., Seattle, Wash., San Antonio, Tex., Houston, Tex., Grand Rapids, Mich., Providence, R. I., and Springfield, Mass.

Seen in the Show Window

THE oil pump which is seen at (M) is the product of the Pedersen Lubricator Co., New York. Being of the rotary sort, it has strong suction and discharge, and is made of high-class bronze and steel. It may be placed in the crankcase or distant from it, and the manner of installation is as simple as can be. Drilling and tapping the camshaft permits of screwing the threaded pumpshaft into same. Single or multiple sight-feed is furnished with the device, which is turned out in several forms and sizes.

STEERING gears have enough work to do in any case, and anything that will tend to relieve them of some of their duties will be in the direction of lengthening the life of the steering equipment. Taking away the jar, strain and trembling of the steering wheel is the end to which the Little Steersman (N) was designed. It consists of a coiled spring, made of oil-tempered steel wire, which is fastened to the two front springs of the car, and also to the center of the steering rod. The arrangement which is seen in the illustration automatically keeps the automobile straight if a tire bursts on a rough or sandy road or even in case the steering gear breaks. Naturally, the device if applied reduces lost motion in the steering system. It is made by the Modern Auto Appliance Company, 4 Kinderhook street, Chatham, N. Y.

SUPPLYING automatic carburetion is among the problems of the day, and in showing the Newcomb carbureter at (O) we here give the last development along these lines. The automatic regulation of the mixture is brought about by the special construction of the vaporizing chamber into which is fitted a plunger carrying in its center a needle which lies in the nozzle when the motor is not operating. If the engine is started and suction is produced, the check valve on top of the mixing chamber and the plunger inside the same are lifted in proportion to the strength of the suction, regulating the lift of the needle and the opening of the nozzle in the same ratio. The plunger lifted uncovers airports in the sides of the vaporizing chamber, and the air being sucked toward the motor enters the chamber by means of a number of small inlets near the bottom. A ring permits of lifting the plunger and withdrawing the needle without uncovering the airports, thus making possible enriching the mixture. The Holtzer-Cabot Electric Co., of Boston, Mass., manufacture this carbureter.



(M) The Pederson rotary oil pump
(N) Little Steersman reduces strain and trembling of steering wheel
(O) Cross section of the Newcomb Carbureter
(P) Kelly sectional tire, designed to reduce expense of operation
(Q) Handy hamper to add to the comfort of touring automobilists
(R) Showing the Rid-O-Skid tire chain

THERE are some details in the motor truck situation which greatly influence the cost of vehicle maintenance as well as their total cost in the long run. Chief among these are idleness, depreciation and tire cost There is a way of operating every freight automobile in some one manner so as to get the greatest possible benefit out of its tires, and in recent times, sectional tires have proved very efficient, especially in those cases where heavy loads have to be propelled. While the mysteries enveloping the tire situation are not entirely unraveled as yet, some of the leading manufacturers have arrived at the standardization of their products, the one of the Consolidated Rubber Tire Co., of New York, the Kelly Block Tire, being shown at (P). Seven sizes of this tire are made in order to comply with the requirements of the various operators of automobile trucks.

TAKING along meals in a hamper without risking their being harmed or doing harm has some advantages which few tourists will deny. Fig. (Q) illustrates the last word in this field, the Simplex Auto Lunch Kit, which is made by the Simplex Mfg. Company, 369 Washington avenue, Newark, N. J. It is sold in three sizes with half-pint, pint or quart Simplex vacuum bottles, the boxes being of metal and leatherette and holding lunch for from one to three persons, respectively. For extended tours, the company sells a trunk outfit, containing four complete *couverts* and taking in food for two days for four tourists. Good material and the comfort they render will be highly appreciated, especially by those who have toured under less commodious conditions and have not forgotten what it means.

WHILE at some time or other nobody doubts that quality cannot be had but at its price, there still is a large class of would-be customers for a less expensive substitute of a high-priced and high-grade article. Recognizing this fact, and at the same time desirous to serve this kind of "economic" customers, the Weed Chain Tire Grip Company, 28 Moore street, New York, have put on the market the Rid-O-Skid tire chain which is illustrated at (R). As the manufacturers frankly admit, while they are as efficient as Weed chains as preventatives of skidding and as means for traction, they are not so long-lived, and, therefore, not so economical in the long run. Rid-O-Skids give about one-third the mileage obtained from Weed tire grips.